VOL. 16 · SEPTEMBER 1958 · NO. 5

A JOURNAL
DEVOTED TO THE ART
AND SCIENCE OF
ORAL SURGERY

JOURNAL OF ORAL SURGERY

Fred A. Henny, D.D.S., Editor
HENRY FORD HOSPITAL, DETROIT

Journal of Oral Surgery, Vol. 16, No. 5, September, 1958. Published by the American Dental Association, 222 East Superior St., Chicago 11, Ill. Yearly subscription $10.00 for U. S. and possessions, $12.00 for foreign countries. Single copy $2.00. Entered as second class matter June 21, 1943 at the post office at Chicago, Ill., under the Act of March 3, 1879. Published bimonthly. Copyright 1958 by the American Dental Association. The Journal of Oral Surgery is indexed in Index to Dental Literature, Quarterly Cumulative Index Medicus and the Current List of Medical Literature.

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VOLUME 16 • SEPTEMBER 1958 • NUMBER 5 JOURNAL OF ORAL SURGERY

A histological study of mucoperiosteal flap healing

■ *Theodore H. Dedolph, Jr., D.D.S., M.S.D., and Henry B. Clark, Jr., M.D., D.D.S., Minneapolis*

Microscopic study of 13 specimens of teeth and surrounding tissues revealed that mucoperiosteal flaps which are raised from about the teeth, will return to their preoperative health level in approximately three weeks. There are, therefore, no contraindications to outlining and reflecting mucoperiosteal flaps of sufficient size to provide optimum visibility and access for a given surgical procedure.

The greater share of oral surgical operations are initiated by the outlining, cutting and raising of a mucoperiosteal flap as a means of gaining access to the hard structures beneath and of maintaining an untraumatized soft tissue blanket for coverage of bone at the completion of the operation.

Virtually all authorities subscribe to the general principle that wide access provided by ample flaps is desirable. Yet many of the flap designs which have been advocated reveal a reluctance to invade the marginal gingiva of teeth adjacent to the area of surgery, presumably because of the belief that the attachment of this tissue would be altered permanently and unfavorably if it were severed during the course of surgery. Consequently many flap designs do not provide the wide view of subperiosteal structures which is needed for uniformly successful oral surgical operations. Adequate exposure is the best insurance against injury, by bone cutting instruments, of such structures as the mental nerve, the wall of the maxillary sinus, and the bone overlying adjacent roots. Wide exposure provides convenient access to the object or lesion to be removed. Large flaps are more easily held aside by the retractor; thus there is less slipping away, less repeated manipulation, and less trauma. Finally, it is most essential that a plateau of undisturbed bone be provided upon which the flap margin may rest, to the end that there will be no chance for this margin to drop into the bony wound, leaving bare bone exposed.

It has been the custom for many years at the University of Minnesota

From the division of oral surgery, School of Dentistry, University of Minnesota.

School of Dentistry to extend the outline of mucoperiosteal flaps unhesitatingly to include the marginal gingival attachment of teeth adjacent to the area of surgery. When these flaps are returned to their former location and sutured with care, the gross clinical results have been uniformly good.

This study was conducted to determine whether the raising and replacing of buccal mucoperiosteal flaps from the necks of teeth would result in any permanent abnormality of the periodontal structures and their attachment to the teeth, as determined by histologic examination.

■ *Variations of Flap Design in Common Use*

A review of the standard texts on oral surgery and of articles in the current literature dealing with flap operations discloses rather general agreement on the requirements of a proper mucoperiosteal flap. Virtually all writers emphasize the need for providing adequate exposure to permit good visibility, maintenance of good blood supply to all margins, and the making of any vertical incisions in such a manner that a plateau of undisturbed bone will remain to support the flap margin when the wound is sutured.

It is not difficult to realize that these requirements have become established through an evolutionary process involving much trial and error.

In 1919 Gardner[1] described a flap for exposure of an impacted lower third molar (Fig. 1, A) which would be heartily criticized today as providing inadequate access for a difficult removal of a deeply situated tooth.

In 1929 Berger[2] advocated more generous reflection of tissue to permit basing the incisions on a solid bone foundation and thus encourage uncomplicated healing (Fig. 1, B).

It will be noted that the outline of Berger's flap carefully avoided invading the free gingiva of the adjacent tooth and provided for diverging incisions to provide good blood supply to the flap margin.

Feldman[3] recommended an almost identical flap outline for this situation (Fig. 1, C) and showed the common concern for preservation of the anatomic relationships of the marginal gingiva by saying, "The replacement and reattachment of a flap thus incised is achieved without any irregularity of cervical outline."

Thoma[4] emphasized the following: "The flap should be of such size that it will more than cover the bone defect created by the procedure, and when it is replaced the incision should rest upon solid bone." Figure 1, D, illustrates the kind of flap he recommended.

Diagrams of flaps found in the textbooks of Archer[5] (Fig. 1, E), Padgett,[6] Winter[7] and others are similar to those which have been described. In each instance no tissue is disturbed at the cervix of adjacent teeth.

1. Gardner, B. S. Retracting and suturing of soft tissues with regard to extraction of the impacted lower third molar. D. Cosmos 61:1092 Nov. 1919.

2. Berger, A. Principles and technique of the removal of teeth. Brooklyn, Dental Items of Interest Publishing Co., 1929, p. 318.

3. Feldman, M. H. Exodontia, ed. 4. Philadelphia, Lea and Febiger, 1951, p. 168.

4. Thoma, K. H. Oral surgery, vol. 1, ed. 2. St. Louis, C. V. Mosby Co., 1952, p. 171.

5. Archer, W. H. Manual of oral surgery, ed. 2. Philadelphia, W. B. Saunders Co., 1956, p. 85.

6. Padgett, E. C. Surgical diseases of the mouth and jaws. Philadelphia, W. B. Saunders Co., 1938, p. 214.

7. Harrigan, W. F., and Winter, Leo, Jr. Winter's textbook of exodontia, ed. 6. St. Louis, C. V. Mosby Co., 1953, p. 204.

By contrast, the texts of Rounds and Rounds,[8] Bourgoyne,[9] and Clark[10] (Fig. 1, F) illustrate flaps which call for vertical incisions a distance of half a tooth or more anterior or posterior to the margin of the bony wound. Dingman and Hayward[11] go farther by advocating severance of interdental papillae and marginal gingivae for a distance of several teeth mesial to a third molar socket in order to obviate the need for a vertical incision, while still providing good exposure.

From this brief sampling of views of writers on the subject it is clear that there is much variation in the practical application of general principles.

■ *Anatomy of Investing Tissues*

Detailed descriptions of structure and relationship of enamel, cementum, periodontal membrane fibers, gingival epithelium and adjacent tissues are not included here as they may be found in any standard text on oral histology.

However, it should be noted that there are at least two different views on the relationship between crevicular epithelium and enamel or cementum or both. Orban[12] feels that there is an organic union of the epithelium of attachment to the tooth. Waerhaug[13] feels that his investigations prove that it is not possible to distinguish microscopically between true attachment and simply intimate contact. Although this difference of opinion has been duly noted, it was not felt to be pertinent to the present study.

■ *Previous Studies of Flap Reattachment*

ORAL SURGICAL STUDIES—In the field of oral surgery, few studies have been made of the histological changes occurring in the healing of mucoperiosteal flaps. A review of the literature has disclosed only two which are closely related to this investigation.

In 1947 Svoboda[14] reported results of a study of two edentulous human patients in whom he raised and then replaced mucoperiosteal flaps. Biopsies were made at varying time intervals ranging from 2 to 53 days. He found that in 22 days the appearance was indistinguishable from the preoperative condition, save for rearrangement of bony architecture, which required 31 additional days for completion.

In 1948 Borden[15] reported his findings on two dog and two human subjects in which specimens were taken at one week and three week intervals, after elevation of mucoperiosteal flaps. Using a method which had been described by Zemsky[16] in 1931 and which closely parallels that which was used in the present study, Borden concluded that reattachment of soft tissues to the tooth does take place clinically after detachment, although he felt that the depth of the gingival crevice was somewhat decreased.

8. Rounds, F. W., and Rounds, C. E. Principles and technique of exodontia. St. Louis, C. V. Mosby Co., 1953, p. 343.

9. Bourgoyne, J. R. Surgery of the mouth and jaws. Brooklyn, Dental Items of Interest Publishing Co., 1949, p. 336.

10. Clark, H. B., Jr. Practical oral surgery. Philadelphia, Lea and Febiger, 1955, p. 165.

11. Dingman, R. O., and Hayward, J. R. Oral surgery in general practice. J.A.D.A. 35:607 Nov. 1, 1947.

12. Orban, B. Histology and physiology of the gingiva. J.A.D.A. 44:628 June 1952.

13. Waerhaug, J. The gingival pocket. Odont. Tskr. (Suppl. 1) 60, 1952.

14. Svoboda, J. F. Clinical study of repair of bone after alveolectomy. J. Oral Surg. 5:91 April 1947.

15. Borden, S. M. Histological study of healing following detachment of tissue as is commonly carried out in the vertical incision for the surgical removal of teeth. J. Canad. D. A. 14:510 Oct. 1948.

16. Zemsky, J. L. Methods of securing fresh human tissues for histopathologic investigation of periodontal conditions. Internat. J. Orthodont., Oral Surg. & Radiog. 17:484 May 1931.

PERIODONTAL STUDIES—Workers in the field of periodontics have reported numerous studies of healing of gingival pockets and the reattachment of epithelial elements both in pathologically and experimentally induced periodontal pockets. However, many of them relied on clinical measurement of pocket depth and roentgenographic evidence of bone regeneration as criteria from which conclusions were drawn.

In 1937 Skillen and Lundquist,[17] working with one normal dog and one pathologic human specimen, found that little or no connective tissue reattachment could be demonstrated after either surgical or pathologic detachment of gingival or periodontal membrane structures. They explained this by the apparent tendency of epithelium to cover rapidly denuded

17. Skillen, W. G., and Lundquist, G. R. Experimental study of peridental membrane reattachment in healthy and pathologic tissues. J.A.D.A. 24:175 Feb. 1937.

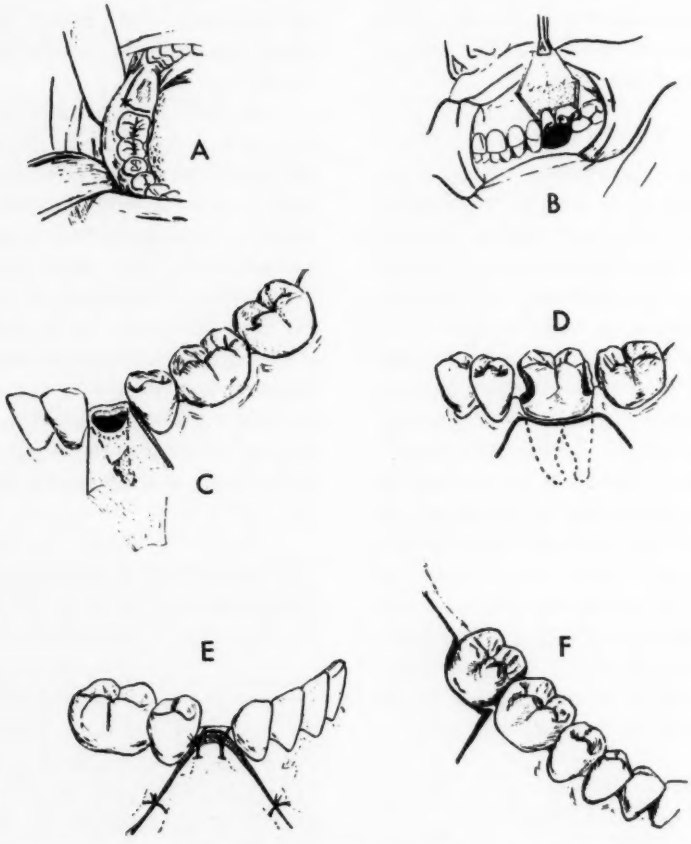


Fig. 1—Flap designs in common use. A, Gardner; B, Berger; C, Feldman; D, Thoma; E, Archer; F, Clark

connective tissue but felt that epithelium did reattach to a certain extent.

In 1945 Archer and Orban[18] found good regeneration of epithelium after gingivectomy in human subjects.

Beube,[19] in 1947, reported that reconstruction of cementum, periodontal membrane and alveolar bone may be demonstrated in dogs after curettage.

In one of several studies on dogs which Linghorne and O'Connell[20] have reported, it has been demonstrated that surgical removal of alveolar bone and periodontal membrane is followed by reattachment of soft tissues to the root through the mechanism of deposition of new cementum on the root surface.

In 1953 Morris[21] was able to prove reattachment of gingival tissues after curettement of root surfaces and removal of epithelial attachment by scarification with curets, but did not feel that reattachment could be produced by this means in instances of naturally occurring periodontal pockets.

In 1953 Schaffer and Zander[22] reported their results of root planing and pocket curettage in eight human beings with well-established periodontosis. Block sections were removed later and histological study performed. In five out of eight instances the pockets were reduced in size and new connective tissue and epithelial attachments were achieved. New cementum was deposited upon both old cementum and dentin, and new periodontal membrane fibers were embedded therein. Not only was new supporting bone formed, but cytoplasmic processes of epithelium could be demonstrated extending into dentinal crevices, forming a new epithelial attachment.

■ *Materials and Methods*

For this study only fresh specimens from living human subjects were used. These were patients who had come to the oral surgery clinic of the School of Dentistry, University of Minnesota, for extractions in preparation for complete dentures. No attempt was made to standardize the indications for extraction or to evaluate the condition of the gingival tissues.

The material for study consisted of 19 amputated portions of teeth and attached tissues secured from 6 different patients. Of the 13 block sections obtained, 8 included 2 teeth in the section. Six specimens were taken from the maxilla and 7 from the mandible.

The experiment was so designed that ample material for study of reattachment of flaps could be secured, but in a manner which would leave an adequate bony ridge, well covered by mucoperiosteum.

The surgical treatment in each instance called for two operations spaced 2 to 28 days apart. The flap outline employed for the first operation provided for a vertical incision through the interdental papilla, placed one tooth anterior to the tooth or teeth ultimately to be removed. Where the teeth in the adjacent area were

18. Archer, E. A., and Orban, B. Dynamics of wound healing following elimination of gingival pockets. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 31:40 Jan. 1945.

19. Beube, F. E. Study on reattachment of the supporting structures of the teeth. J. Periodont. 18:55 April 1947.

20. Linghorne, W. J., and O'Connell, D. C. Studies in the regeneration and reattachment of supporting structures of the teeth. I. Soft tissue reattachment. J. D. Res. 29:419 Aug. 1950.

21. Morris, M. L. Reattachment of human periodontal tissues following surgical detachment: a clinical and histological study. J. Periodont. 24:220 Oct. 1953.

22. Schaffer, E. M., and Zander, H. A. Histological evidence of reattachment of periodontal pockets. Paradent. 7:101 Oct. 1953.

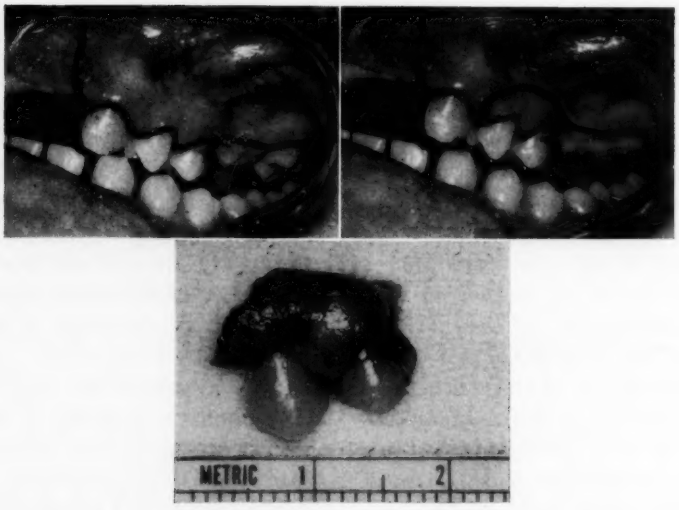


Fig. 2—Above left: Initial flap design. Above right: Specimen flap design. Below: Specimen

missing, the incision was made approximately 0.5 cm. anterior to the tooth to be extracted. This incision extended from the papilla (or crest of the ridge if the area had no teeth) to the mucobuccal fold. An incision was then made distally in the gingival sulcus, following around the necks of all teeth distal to the vertical incision. An additional incision was made on the crest of the ridge extending from the distal surface of the last tooth straight back for approximately 1.0 cm. (Fig. 2, above left). The buccal mucoperiosteal flap thus outlined was raised with a periosteal elevator, the most posterior teeth (which were not to be used in the study) were extracted, the bone was smoothed, and the flap sutured back to place with interrupted sutures of no. 000 black silk.

These flaps were allowed to heal for varying periods before specimens were secured for study. The intervals selected were 48 hours, 1 week, 2 weeks, 3 weeks and 4 weeks.

The incisions used in obtaining specimens of teeth and associated buccal tissues were made by incising vertically the interdental papillae at the mesial and distal limits of the block to be removed, then connecting these incisions with a curved horizontal incision placed a few millimeters apical to the estimated level of the gingival sulcus. At this point the incisions which had been made at the first operation were repeated, except in the area of the block section (Fig. 2, above right) and the original mucoperiosteal flap was raised again, except in the area of the specimen.

A no. 560 crosscut fissure bur with the end ground to a chisel point was used for removing the hard tissues as one block (Fig. 2, below). With the bur directed from the buccal side the soft tissue in-

cisions described were carried into bone and roots of teeth, nearly separating the block of hard tissues from the alveolus. An intermittent stream of water was played on the bur at all times. Final separation of the block from the remaining lingual attachments was performed with a thin chisel or periosteal elevator. Each specimen was fixed immediately in Zenker's solution and later washed in tap water, decalcified in 5 per cent nitric acid, and embedded in celloidin. Sections were cut buccolingually 12 microns thick, mounted, and stained with hematoxylin and eosin.

The operation was completed by extracting and discarding the most anterior tooth, removing the roots which had been sectioned by the bur, smoothing the bone, and closing the wound with interrupted silk sutures. Moderate undermining was required to relax the buccal flap in the region where the specimen had been taken to permit closure of the tissues without tension.

■ *Results*

The various sections taken at any given time interval were all remarkably similar. The brief descriptions given in the following paragraphs and the photomicrographs taken at random from each time interval group (Fig. 3-5) are a composite of the findings, but there was very little difference between the sections in any one group. The illustrations portray the steady progression to complete healing and apparent reattachment at three weeks. As the histological appearances at three and four weeks were virtually indistinguishable, the latter are not shown. A control section of a surgically undisturbed periodontal region (Fig. 6) is included for comparison with the typical

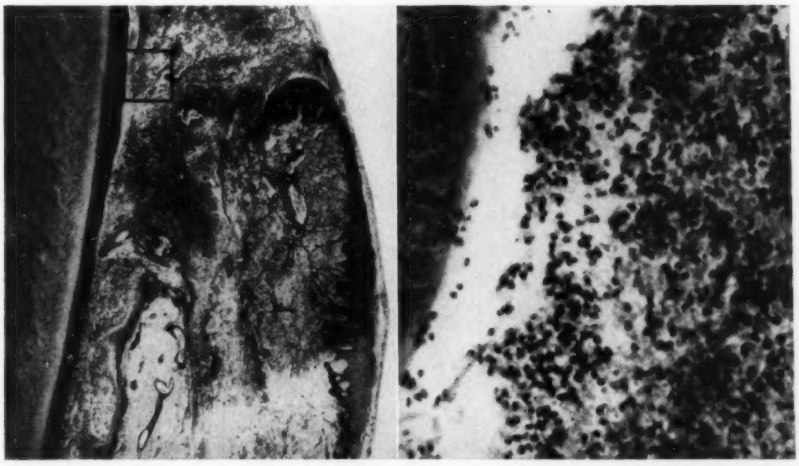


Fig. 3—Forty-eight hour specimen. Left: Gingival epithelium separated from tooth and bone by acute inflammatory exudate and hemorrhage. Right: Higher power view of area of inflammation shown at left

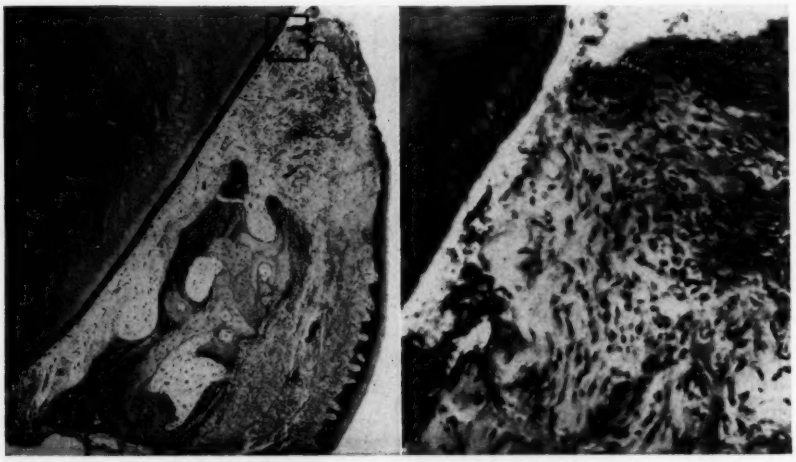


Fig. 4—One week specimen. Left: Note regeneration of epithelium over rather mature granulation tissue and re-establishment of periodontal membrane. Right: Higher power view of area at left, showing regeneration of epithelium

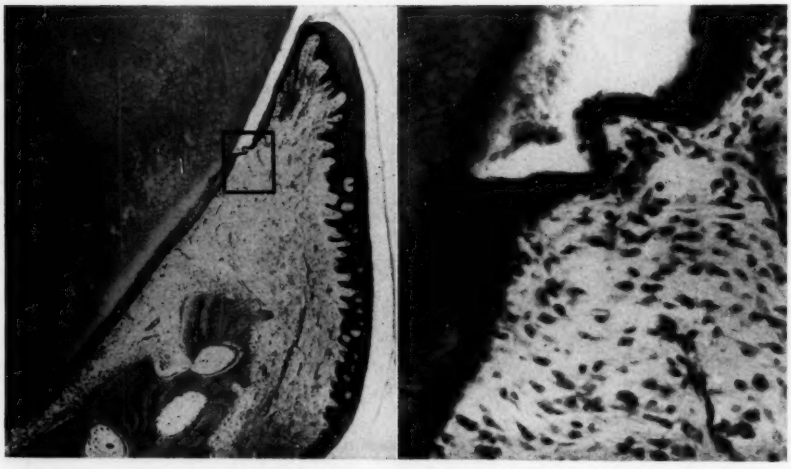


Fig. 5—Three week specimen. Left: Specimen shows complete healing. Note similarity to control section, Figure 6. Right: Higher power view of section at left. Regenerated epithelium extends to cementoenamel junction

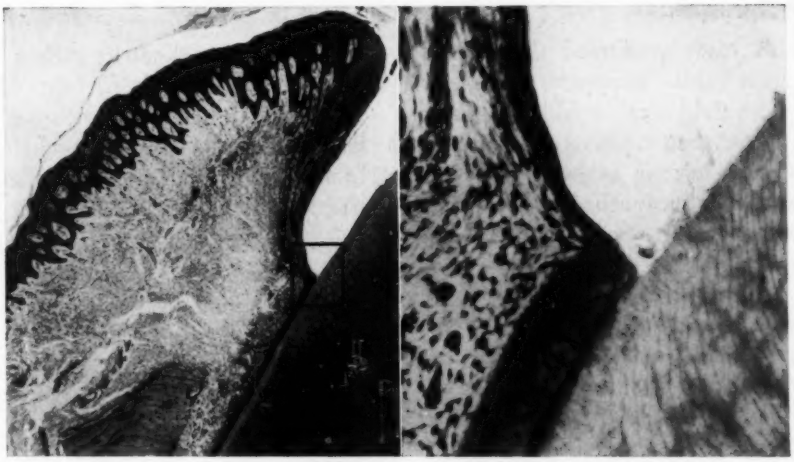


Fig. 6—Control section. Left: Low power view to be compared with three week experimental section in Figure 5. Right: Higher power view of section at left

experimental specimen removed at three weeks.

FORTY-EIGHT HOURS—Two specimens were removed after 48 hours. At this early period there was complete separation of epithelium and subepithelial connective tissue from the adjacent tooth. The space between hard and soft structures was filled with acute inflammatory exudate and hemorrhage. No gingival periodontal membrane fibers were seen (Fig. 3).

ONE WEEK—Five specimens were removed after one week. At this point the acute inflammatory phase had given way to a scene of generalized repair. Epithelium had proliferated, covering the rather mature granulation tissue beneath, and had extended toward the tooth surface. Unmistakable evidence of regeneration and lining up of gingival periodontal membrane fibers was apparent (Fig. 4).

TWO WEEKS—Two specimens were removed after two weeks (not illustrated). Advanced stages of repair and regeneration of all tissue elements were seen.

THREE WEEKS—The appearance of the specimen removed at three weeks (Fig. 5) was indistinguishable from that of a control (surgically undisturbed) section (Fig. 6). Epithelial regeneration and reattachment were complete. Rete pegs were not excessively long, and little to no subepithelial inflammation was seen. Gingival periodontal membrane fibers and periosteum appeared intact, and no evidence of the previous injury was apparent.

FOUR WEEKS—The three sections removed at four weeks (not illustrated) revealed the healed appearance found in the specimens that were removed at three weeks.

■ *Discussion*

This study confirmed the clinical observation that mucoperiosteal flaps raised from the buccal or labial aspect of sound teeth, then replaced and sutured with reasonable care, heal promptly and become firmly reattached in approximately three weeks. Serial chronological histologic sections gave the impression of strong dynamic processes at work during the healing period which were directed toward complete restoration of the preoperative anatomic status.

This return to virtual anatomic normalcy is even more remarkable when it is recalled that the teeth in these specimens had been condemned because of advanced dental disease. Varying degrees of gingival inflammation, with associated calculus, were present. In spite of these adverse features, healing progressed well. It is possible that some calculus was removed incidentally during the raising of the flaps, by periosteal elevator and suction aspirator, but no concerted effort was made to scale these teeth at the time of initial raising of the flaps.

The observations made in this study should not be construed to sanction careless operative technic, for in our opinion gentle handling of tissues, removal of calculus and other debris from the wound, and meticulous replacement and suturing of flaps should be done in all instances.

With these provisions there would appear to be no reason for refraining from stripping up buccal and labial mucoperiosteum to enhance surgical exposure and access whenever it is required.

■ *Summary*

1. After preliminary raising and replacing of mucoperiosteal flaps, 13 block sections of teeth and surrounding tissues were removed at varying time intervals from the mouths of six patients, and prepared for histologic examination.

2. At 48 hours the epithelium and free gingival fibers were separated from tooth and bone by acute inflammatory exudate and hemorrhage.

3. At one week the acute inflammatory exudate had been replaced by chronic inflammation covered by proliferating epithelium. The free gingival periodontal fibers were regenerating and rearranging themselves.

4. At three weeks the epithelial attachment was complete, the attachment of periodontal membrane fibers and other connective tissue elements was restored, and the inflammatory response was mild or absent. The appearance was indistinguishable from that of control sections and from that of the four week experimental sections.

5. The results of this study confirm the clinical impression that mucoperiosteal flaps raised from about teeth which are to be retained will return to their preoperative status in approximately three weeks.

6. In view of these observations there should be no hesitation in outlining flap designs of sufficient size to provide maximum visibility, wide access, and a broad surface of bone on which the flap margin may rest for optimum healing.

Prognathism in edentulous and partially edentulous patients

■ *Jack B. Caldwell,* D.D.S., M.Sc., U. S. Army, and Kenneth W. Hughes,† D.D.S., Ft. Leonard Wood, Mo.*

Although mandibular prognathism is seen rather often in edentulous patients, there has been no satisfactory operation designed for its correction. Operative procedures that have been suggested for correction of the edentulous prognathic mandible have all had disadvantages. Ostectomy in the body of the mandible has the disadvantage that (1) the denture-bearing area is shortened; (2) circumferential wiring over intraoral splints usually results in inflammatory changes in mucosa under pressure, and (3) nonunion may occur in spite of all precautions.

Vertical ostectomy has been found to be a satisfactory procedure in the three instances in which it was used. It is recommended as the ideal operation to correct this condition.

Heretofore two types of patients with prognathism have been exceedingly difficult to treat surgically and have a favorable prognosis. These are patients who have only anterior teeth remaining and those who are completely edentulous. The prognosis for the first type is almost as unfavorable as it is for those with no teeth. Surgical treatment of prognathism in either type of patient can be undertaken with confidence when the operation is done by vertical section in the rami, a proceeding which has been described previously.[1] In substantiation of this statement, the case histories of three patients will be presented.

Unfortunately, persons with malocclusion of any type have a predisposition to caries and periodontal disease. This is easy to understand since oral hygiene is difficult to maintain and also many malocluded teeth are subjected to abnormal stress in function. In persons with Class III malocclusion with associated prognathism, it is a common observation that few and sometimes no teeth are in functional relationship. Thus the additional factor of disuse becomes a primary cause for early deterioration and loss of teeth. These are substantial reasons why such a high percentage of patients with prognathism are dental cripples and are potential candidates for complete dentures at a relatively early age.

All authorities agree that surgical correction of prognathism achieves the best results if the patient still has his natural dentition. If for no other reason, this is true because the teeth can be relied on for immobilization of the mandible during the postsurgical healing period. Occasionally inexperience or lack of information has resulted in a patient being

*Colonel, Dental Corps, U.S. Army; chief, dental service, 2nd General Hospital, APO 180, New York. Formerly, chief, oral surgery section, Letterman Army Hospital, San Francisco.

†Lt. Colonel, Dental Corps, U.S. Army; chief, oral surgery, U.S. Army Hospital, Fort Leonard Wood. Formerly, oral surgery resident, Letterman Army Hospital, San Francisco.

1. Caldwell, J. B., and Letterman, G. S. Vertical osteotomy in the mandibular rami for correction of prognathism. J. Oral Surg. 12:185 July 1954.

rendered edentulous in the belief that complete dentures can be constructed to correct the occlusion relation. Such correction might be possible in patients with only a slight degree of protrusion; however, it is our belief that successful functional dentures cannot be made for patients who have moderate to extreme prognathism; that is, 1 cm. or more of protrusion.

Numerous articles have been written and several surgical technics proposed for the correction of the facial deformity of mandibular prognathism. There is a noticeable lack, however, in regard to the specific management of this deformity in patients who are edentulous or who have few remaining teeth.

In 1951, Kazanjian[2] considered the problem of mandibular prognathism in edentulous patients and reported on the surgical treatment of four patients. Two of his patients had no teeth and the other two had none in the maxilla. He treated the two without upper teeth by sectioning the ramus horizontally above the foramen by an extraoral procedure. The two patients without lower teeth were treated by ostectomy or the removal of a measured section from the body of the mandible. He emphasized the need for thorough immobilization in all instances, and recommended use of an upper Kingsley splint and bars attached to a head cap with immobilization provided by intermaxillary wiring to a cable arch wire or a banded arch wire splint cemented to the lower teeth. To augment stability and diminish the stress on the lower anterior teeth, he added a circumferential wire at the symphysis which was secured to the maxillary splint. In the two instances in which the mandibles were edentulous, no details were offered except that the "fragments were secured by direct interosseous wiring supplemented with a bite plate and external bandage."

In 1953, Van Alstine and Dingman[3] described a technic for the correction of mandibular protrusion in edentulous patients. The surgical procedure had been described previously by Dingman,[4] ostectomy in the body of the mandible. They reported on five instances and recommended splinting the mandible during the healing period, although one patient obtained union without benefit of splinting. Interosseous wiring of the sectioned parts sufficed to maintain immobilization. In three patients, acrylic splints, much the same as individual impression trays, were wired circumferentially to the mandibular ridges two to six weeks postoperatively to assure union. In the last instance, the splint was applied initially. Relapse occurred in one patient but clinical union was present in all instances in eight weeks or more.

Cameron and Stetzer[5] reported on extreme prognathism in an edentulous patient which they treated by ostectomy. The bone was stabilized during healing by means of tantalum "saddles" or trays adapted to the lower border of the mandible and wired circumferentially to the bone. Since this metal is well tolerated

2. Kazanjian, V. H. The treatment of mandibular prognathism with special reference to edentulous patients. Oral Surg., Oral Med. & Oral Path. 4:680 June 1951.

3. Van Alstine, R. S., and Dingman, R. O. Correction of mandibular protrusion in the edentulous patient. J. Oral Surg. 11:273 Oct. 1953.

4. Dingman, R. O. Surgical correction of developmental deformities of the mandible. Plast. & Reconstr. Surg. 3:124 March 1948.

5. Cameron, J. R., and Stetzer, J. J. Bilateral resection of mandible to correct prognathism. J. Oral Surg. 6:69 Jan. 1948.

ordinarily, this means of stabilization is very satisfactory.

In 1954 Letterman and Caldwell[1] stated that "vertical osteotomy should be an ideal method for the correction of prognathism in edentulous patients." This conclusion was based on the success obtained with a patient who had no opposing occlusion of teeth on the right side posteriorly because of the absence of lower molars. It was pointed out that "vertical relation was maintained during the postsurgical healing period by the method of osteotomy used and by direct interosseous wiring." Successful results attained in the instances to be described herein bear out this prediction.

■ *Case 1*

A 21 year old enlisted man was admitted to Letterman Army Hospital on April 23, 1956. His chief complaints were of difficulty in mastication due to the absence of all posterior teeth and Class III malocclusion of the remaining anterior teeth, as well as facial disfigurement associated with moderate mandibular prognathism. He had been examined recently by his dentist who, after evaluating the observations, recommended extraction of the remaining teeth and the construction of complete dentures. Because of the mandibular prognathism, the patient was considered a poor candidate for the dentures and was referred for consideration of corrective surgical treatment.

EXAMINATION — The mandibular prognathism with an associated obtuse gonial angle was readily apparent (Fig. 1, above). Intraoral examination revealed a protrusive relationship of the remaining teeth. The mandibular bicuspid and first molar were missing, as were the maxillary left cuspid and posterior teeth bilaterally. Numerous carious lesions were evident in the remaining teeth. There was no occlusal or incisal contact of remaining teeth. The soft tissues of the oral cavity were normal in appearance and character. Laboratory examinations including differential blood count and urinalysis were essentially normal. The results of the serologic test and the routine chest roentgenographic examination were negative. Periapical roentgenographic examination of the teeth revealed evidence of periapical infection about the lower right lateral incisor. Posteroanterior and lateral roentgenograms of the mandible were essentially normal, except for the obvious mandibular prognathism. Direct lateral views of the skull, facial bones and mandible revealed the degree of prognathism (Fig. 1, center left).

Appraisal of the clinical and roentgenographic observations together with study models properly mounted on an articulator indicated the mandibular prognathism could be corrected by surgical treatment. The degree of prognathism, as measured between the incisal edges with the mandible in rest position was approximately 11 mm. Since preservation of vertical dimension in the denture bearing region was of paramount importance with this patient, and because the remaining teeth were not satisfactory for prolonged use in intermaxillary fixation, bilateral vertical osteotomy in the mandibular rami was chosen as the best method of corrective treatment. From tracings of lateral skull roentgenograms, templates were prepared in preoperative study models of the

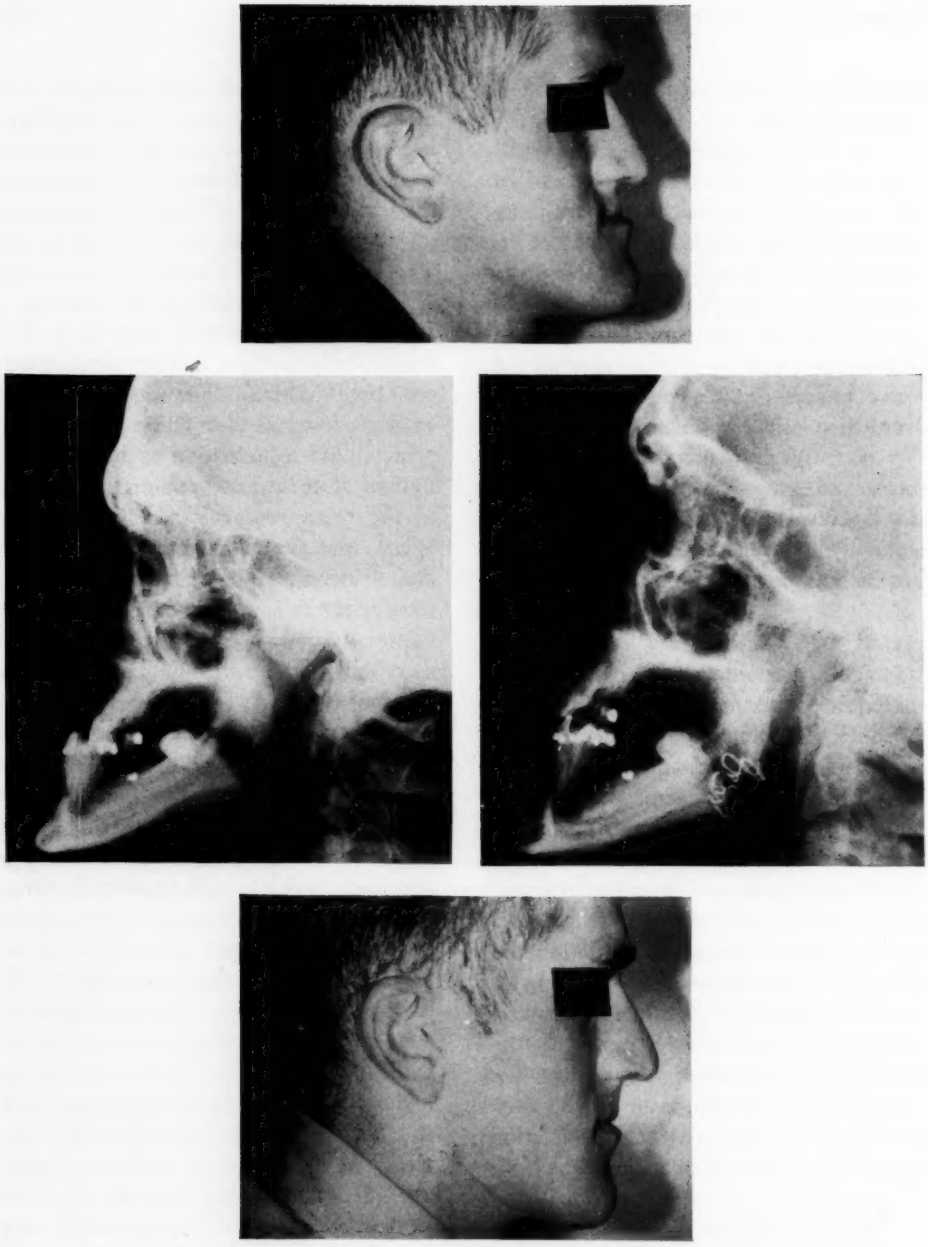


Fig. 1—Case 1. Above: A 21 year old man with moderate mandibular prognathism (11 mm. of protrusion). Center left: Direct lateral view of skull and mandible reveals degree of prognathism and lack of occlusion posteriorly. Center right: Lateral head view, five weeks postoperatively, reveals excellent skeletal symmetry, good incisal relations, and adequate vertical dimension posteriorly. Below: Final examination three months postoperatively reveals no change in previously established jaw relations and improved appearance

mandible. By repositioning the models, it was determined that normal tooth and ridge relation could be achieved.

TREATMENT AND COURSE—On April 26, the mandibular left lateral incisor was extracted and intramaxillary loop wiring was applied to the remaining opposing teeth under local anesthesia. It was determined prior to surgery, from study of the template, the precise placement of fragments needed to preserve vertical dimension at the time of surgery.

On April 27, vertical osteotomy of the mandibular rami and correction of the mandibular prognathism was carried out without event. The operation was essentially the same as that previously reported.[1] Preoperative planning guided reduction of the fragments of the sectioned rami, so that adequate vertical dimension was not jeopardized. The mouth was inspected on completion of reduction of the fragments and prior to wound closure to assure adequate vertical dimension.

The immediate postoperative course was uneventful. The patient progressed very well. On May 2, dressings and sutures were removed from the operative sites. There was no evidence of damage to the fifth or seventh cranial nerve after surgery. On May 25, 28 days postoperatively, intermaxillary elastic ligatures and intramaxillary multiple loop wiring were removed. There was no mobility demonstrable on clinical examination. On June 1, there was no noticeable change in the postoperative occlusal relationship on reexamination. Evaluation at this time indicated that the patient functioned without difficulty, was asymptomatic, and had an excellent cosmetic result (Fig. 1, center right). He was therefore discharged from the hospital and referred to his dentist for construction of dentures. The patient was seen for further follow-up approximately three months later, at which time the excellent results of vertical osteotomy in the rami were reconfirmed (Fig. 1, below).

■ *Case 2*

A 25 year old Negro noncommissioned officer whose chief complaints were difficulty with mastication of food and facial deformity consisting of protrusion and asymmetry of his lower jaw. He was first seen for consultation on June 13, 1956, but was not admitted for treatment until August 21.

Physical examination disclosed a well developed young man with essentially normal findings except for those referable to his chief complaint. The mandibular prognathism was moderate with a measured protrusion of 12 mm. (Fig. 2). Oral examination revealed loss of all posterior teeth except for the left upper and lower first bicuspids and the right lower first bicuspid. The maxillary central and lateral incisors had been almost completely destroyed by caries. In addition to a pronounced Class III malocclusion, there was a cross-bite relation, with shift of occlusion to the left. Though there appeared to be overdevelopment of the right side of the mandible which had resulted in asymmetry, the deviation of occlusion to the left was thought to be at least partially caused by the malfunction. Regardless of the cause, there was almost 1 cm. of discrepancy in maxillary and mandibular midline relationship.

Routine preparation for surgery included hematologic and serologic exami-

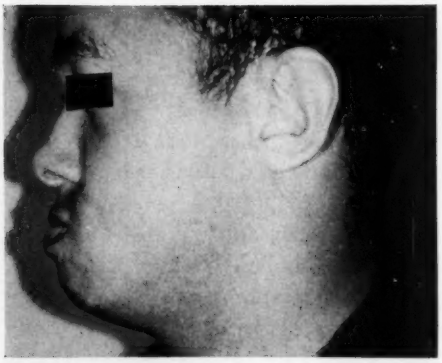
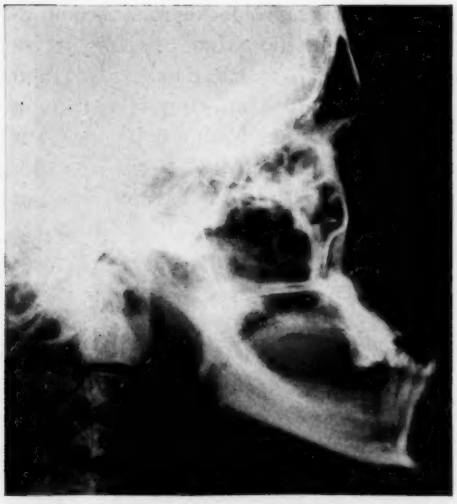


Fig. 2–Case 2. A 25 year old man with moderate mandibular prognathism (12 mm. protrusion)



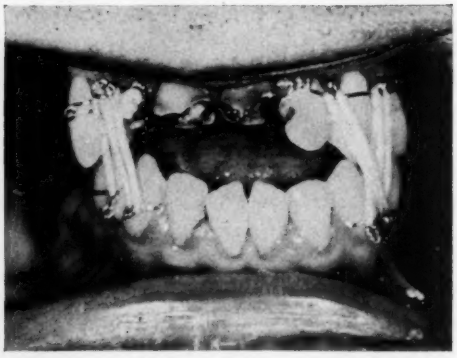


Fig. 3–Case 2. Above left: Degree of protrusion and lack of occlusion posteriorly are shown in lateral skull roentgenogram. Above right: Intermaxillary elastic fixation used for immobilization after vertical osteotomy in rami. Elastic fixation was removed three weeks after operation and wiring was removed on twenty-fifth postoperative day. Below left: Lateral skull view demonstrates adaptability of vertical osteotomy for correction of prognathism when no posterior teeth remain. Interosseous wiring of mortised parts assures maintenance of vertical dimension and rapid bony union

nations, urinalysis, type and cross match for blood replacement, and dental roentgenographic examinations, lateral and posteroanterior cephalometric studies (Fig. 3, above left), preparational study models of teeth and application of intradental wiring for immobilization of the jaws.

Every available tooth was incorporated into the wiring but Figure 3, above right (postoperative view) shows that only five maxillary teeth were suitable for this purpose. Therefore, standard Ivy loops were relied on for fixation.

On August 24, the patient was taken to the operating room and vertical osteotomies were done bilaterally in the mandibular rami. Apposition of the sectioned fragments was accomplished according to previously determined template measurements assuring normal posterior ridge relation and vertical dimension (Fig. 3, below left). The operation was carried out without complications during surgery or postoperatively. Dressings and sutures were removed on the fourth day after surgery. On September 14, three weeks after his operation, the intermaxillary elastic traction was removed and the patient was permitted to eat. On September 18, the few remaining maxillary teeth were removed. Complete upper and partial lower dentures were inserted on October 2, 39 days postoperatively. The patient was then returned to duty, pleased with the result (Fig. 4), and was seen on follow-up examination two months later at which time no changes in occlusion could be detected.

■ *Case 3*

A 36 year old noncommissioned officer was first seen for consultation as an outpatient on May 2, 1956. He was admitted to the Letterman Army Hospital on May 29 with the principal complaint of difficulty in mastication and unsatisfactory dentures. The patient had been troubled since childhood with mastication because his "natural teeth did not strike properly." Three years previously his remaining teeth had been extracted in an effort to provide functional efficiency. Since that time he had been "in real trouble" and repeated adjustment and remaking of the dentures failed to afford improved function. The patient's dentist believed the mandibular prognathism obviated satisfactory denture function and referred the patient for consideration of corrective surgical treatment.

Fig. 4—Case 2. Final results which were pleasing to patient

EXAMINATION—Physical examination showed everything to be within normal limits, except for the pronounced mandibular prognathism (Fig. 5, above). Hypertrophy of the soft tissues on the anterior maxillary edentulous ridge with complete

loss of alveolar bone because of denture imbalance was also observed. Revision and correction of this ridge deficiency was accomplished on May 3 on an outpatient basis as a preliminary to the major surgery. The mandibular ridge was normal for a patient that had been edentulous three years. Roentgenographic examination was essentially negative except for considerable protrusion of the mandible together with obtuse gonial angles. Results of the laboratory examinations were negative or within normal limits. Appraisal of lateral cephalogram-type roentgenograms of the skull revealed the true degree of prognathism (Fig. 5, center left). Tracings and "paper cut-outs" of the mandible were made from these films for use in preoperative analysis of the deformity. As with the preceding patients, preservation of denture-bearing space and region was considered to be of primary importance. The mandibular rami were selected as the best sites for surgery because vertical dimension (denture space) could be preserved thereby, and good ridge relation could be provided. In contrast, ostectomy in the body of the mandible would necessarily reduce the denture bearing area even if union after surgery could be assured.

TREATMENT AND HOSPITAL COURSE—Prior to the operation, acrylic Gunning-type bite-blocks were constructed. Through casts arbitrarily mounted on an articulator, the approximate postoperative relation of the mandible and maxilla was simulated, and the bite-blocks were adjusted for contact in this relation. In this manner, the bite-blocks provided a preformed Gunning splint which would receive final occlusal plane adjustment after surgery (Fig. 5, center right). On June 1, 1956, the patient was operated on for correction of the mandibular prognathism by vertical osteotomy.

The patient withstood the procedure well and returned to the recovery ward in good condition. He was able to take a liquid diet on the first postoperative day, and subsequently, adequate fluid intake was taken without difficulty. On June 5, semipressure dressings and sutures were removed. Normal healing appeared to be in progress at the operative sites. No evidence of motor or sensory nerve damage, secondary to the surgical procedures, was noted.

The preformed Gunning splint was adjusted for proper occlusal contact and inserted on June 6. The support and stabilization of the mandible afforded by the splint provided more comfort during the ensuing two weeks. On June 19 construction of the denture prostheses was started. On July 11 approximately six weeks after surgery, final adjustment on the dentures was completed (Fig. 5, below). Final evaluation of the condition of the patient on July 16 indicated there was a firm clinical union at the operative sites and the patient was masticating a normal diet without difficulty. No shift in occlusal relationship of the teeth was noted, and a lateral skull roentgenogram disclosed harmonious jaw relationship (Fig. 6, above). On discharge from the hospital July 16, mandibular function was normal and considerable cosmetic improvement was evident (Fig. 6, below). The patient was highly pleased with the results of his treatment. He was seen for follow-up on September 4.

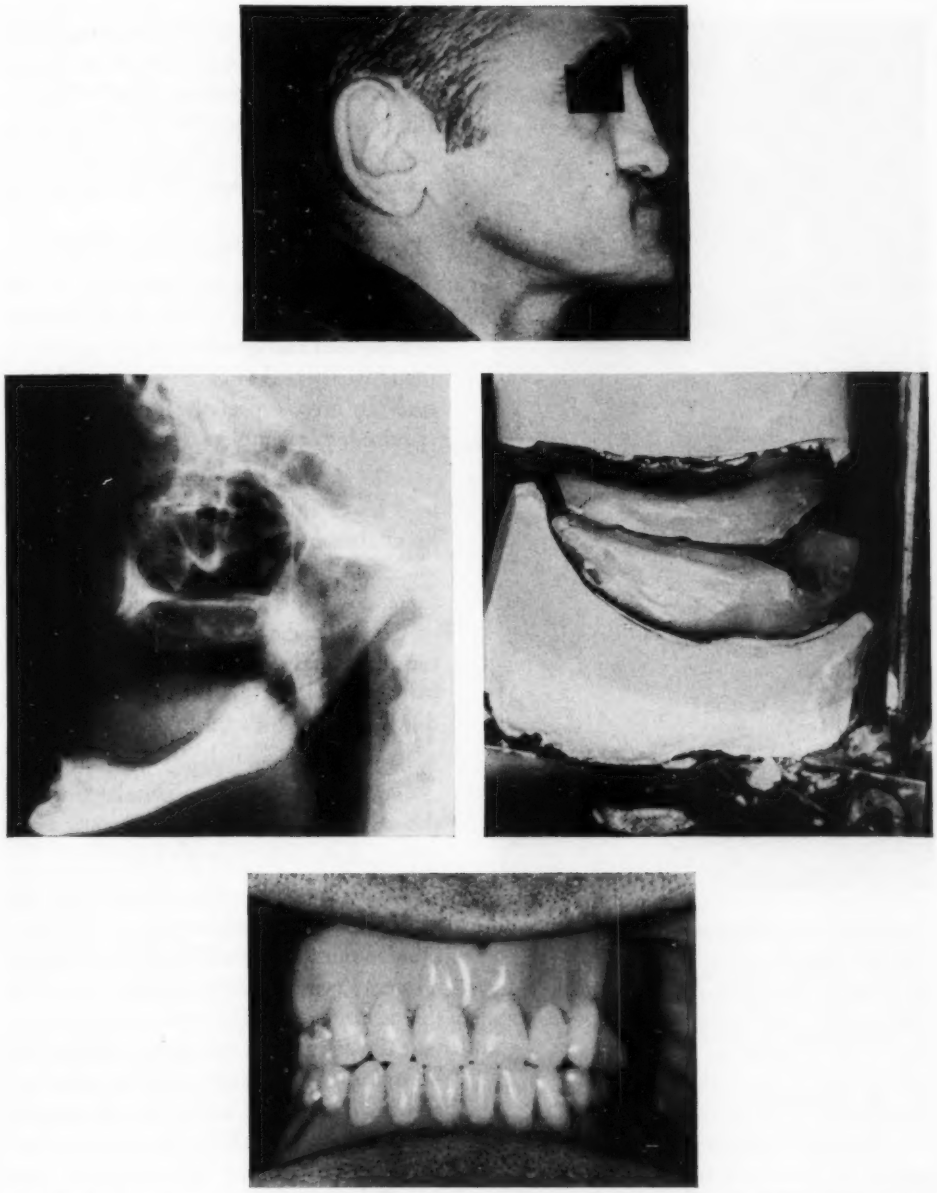


Fig. 5—Case 3. Above: A 36 year old completely edentulous man with moderate prognathism. Center left: Lateral skull view which shows degree of protrusion; also loss of alveolar bone from anterior maxillary ridge can be noted. Center right: Wax models from which Gunning-type splints were prefabricated. Acrylic splints were provided to serve as props during healing period. Below: Dentures were initiated on nineteenth postoperative day and inserted ten days later

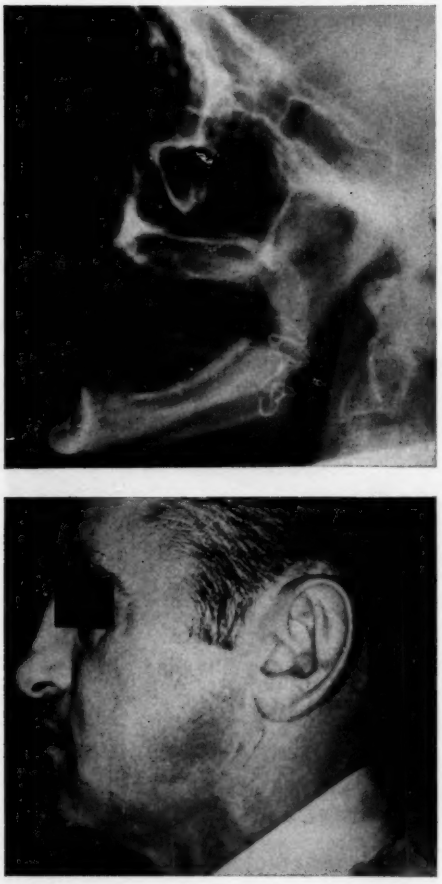


Fig. 6—Case 3. Postoperative lateral skull view shows normal jaw and ridge relationship with adequate denture space. Normal gonial angle also can be seen, with no tendency to open bite anteriorly. Below: Postoperative view showing general improvement of facial appearance

■ *Summary*

Surgical correction of prognathism in patients who are edentulous or have few remaining teeth has received very little attention in the past as evidenced by the dearth of articles on the subject available in the literature. Yet this is a problem encountered fairly often. An ideal solution to the problem has not been offered previously. Disadvantages of ostectomy in the body of the mandible with fixation of the parts by any saddle type splints secured with circumferential wiring are apparent at once.

The disadvantages are as follows:

1. Shortening of the body of the mandible results in a decreased denture-bearing area and prosthodontists are unanimous in their desire for conservation of such an area, especially in patients who require lower complete dentures.

2. A splint circumferentially wired to a lower ridge for 6 to 12 weeks with no chance for removal can only result in moderate to severe inflammatory change in mucosal surfaces with compression of tissues and ulcer formation. The splint cannot be fabricated accurately prior to surgery, and its initiation cannot be accomplished satisfactorily or with good adaptation immediately after surgery.

3. Even with accurate adaptation of the sectioned bone and firm transosseous wiring, nonunion may occur.

Treatment of this abnormality by means of vertical osteotomy in the mandibular rami has been found satisfactory. The three case histories reported illustrate the advantages of the operation and support the contention that this condition can be corrected surgically and the operator can have complete confidence of a good result being attained.

■ *Conclusions*

Bilateral vertical osteotomy as described in a previous article, is an ideal method for the surgical correction of man-

dibular prognathism in patients who are edentulous or who have few remaining teeth. If careful attention is given to the planning of the surgery, by utilizing direct lateral skull roentgenograms and preparation of the templates, the operation can be performed with accurate apposition of the sectioned parts of the ramus and no prosthetic splinting is necessary. Healing is rapid and dentures can be prepared within three to five weeks after surgery.

The psychogenic component in oral diagnosis

■ *L. E. Himler, M.D., Ann Arbor, Mich.*

There is an increasing awareness among oral surgeons of the need for proper evaluation of the personality factor in patients with dentofacial diseases or deformities. There is, therefore, a need for technics which will permit adequate appraisal of the psychogenic component and subsequent management of the patient. Physical evaluation should first rule out organic disease. If psychotherapy is indicated, the patient must be properly prepared for referral by being assisted to distinguish between his perception of pain and his subsequent reaction to it. With this insight and appreciation of the emotional aspects of his problem, he is then ready for reference for psychotherapy.

During the past ten years there has been a steadily increasing number of articles in dental journals on the subject of psychosomatics. Because of the intimate relationship which exists between the face, mouth and teeth and the patient's emotional and social life, oral surgeons are keenly aware of the importance of the personality factor in dentofacial disease or deformity. Oral habits are associated with the earliest and most primitive emotional experiences, and it is known that some persisting personality distortions can be traced to deprivation of satisfaction for oral needs in infancy. It is certain that oral diagnosis and treatment are incomplete without full consideration of psychologic or psychiatric components.

Manhold[1] stated recently that illness from psychological causes might well constitute about one third of all cases in dentistry just as in medicine. Furthermore, another one third have emotional factors which complicate and add to the burden of the physical disease or impairment. Oral psychosomatic disorders occur at all ages and tend to be more common in women, particularly in the involutional years.

The Chalmers J. Lyons Memorial Lecture, presented at the thirty-ninth annual meeting of the American Society of Oral Surgeons, Miami, Fla., November 1, 1957.

Chairman of the staff, Mercywood Hospital, and associate professor of mental health, School of Public Health, University of Michigan.

1. Manhold, J. H., Jr. Introductory psychosomatic dentistry. New York, Appleton-Century-Crofts, Inc., 1956.

The oral surgeon has need for technics which will permit adequate appraisal of the psychogenic component and management of the patient. The differential between normal and expected emotional stress and anxiety, and pathologic emotional states, is not always apparent at first examination. Undoubtedly in the majority of patients the emotional element can be resolved satisfactorily by adequate treatment of the disorder with which it is associated. In a considerable number of other patients the oral surgeon's use of simple psychological first aid is sufficient to restore the patient's emotional equilibrium. There remains a minority of patients in whom the psychologic element is prominent and who may require treatment by both the oral surgeon and the psychiatrist. In this group it is important that the oral surgeon avoid duplication of the unrealistic expectations which the patient may have. Surgical procedures in some instances, especially if repeated, may have the effect of accentuating neurotic reactions and rendering eventual psychiatric treatment more difficult. Every dental general practitioner and oral surgeon has had experience with patients who continue to have symptoms after adequate treatment, and in whom a deeply seated neurotic fixation eventually required extensive psychotherapy.

The dilemma of deciding how much attention will be required by the psychogenic aspects requires real diagnostic acumen. Fortunately the oral surgeon need not be concerned with the details of extensive psychiatric examination and precise diagnosis as a preliminary step in each instance. The oral surgeon must steer a middle course between ignoring the psychologic factors and, on the other extreme, an overdependence on psychiatric consultation. The most practical approach is to be alert constantly to all clues which reveal the degree, depth and chronicity of the emotional element, and then to observe the extent to which it accentuates or distorts the orodental disease which may be present.

In some of the more unusual or bizarre personality problems and frank mental disorders, the problem of deciding whether surgery is indicated or needed will not be particularly difficult. For example, this is true with the schizophrenic patient who has an irrational obsession regarding a nonexisting facial deformity. Another example is that of the extremely obsessive patient who in succumbing to obscure guilt reactions insists on sacrificing healthy organs. Occasionally the dentist will see an excited or agitated manic-depressive patient who complains dramatically but unconvincingly of shifting orofacial symptoms, and whose general behavior and attitude betray his obvious need for immediate psychiatric referral. One recent study of a group of manic-depressive patients revealed that as high as 11 per cent complained of burning tongue as one of their many somatic symptoms. Secretory alterations of the parotid gland are not unusual as a concomitant of this mental disorder.

A small group of fairly common oral disorders frequently may be caused or complicated by subconscious emotional conflicts. The following are examples of conditions included in this category:

1. Atypical facial pain or swelling.
2. Atypical neuralgia such as glossodynia or burning tongue.

3. Malocclusion with occlusal neurosis or bruxism or both.

4. Refusal to open the mouth (hysterical trismus).

5. Temporomandibular joint disorders.

6. Painful and atrophic alveolar ridges.

7. Refusal to wear dentures and prosthetic devices.

8. Polysurgical addiction, especially for cosmetic reasons.

9. Various other psychoneuroses of conversion type with dental, oral or facial fixations.

■ *Interview Technics Used in Appraisal of the Patient*

Every dental general practitioner and oral surgeon acquires certain "rules of thumb" which aid him in detecting patients whose mental and emotional stability render them poor prospects for recovery from surgery alone. An adequate survey of all possible physical factors must be made, whether or not psychogenic factors are suspected or revealed during the examination. Neurotic patients are particularly critical of physicians and dentists who arrive at conclusions which apparently are not substantiated by a complete examination. In psychiatry a diagnosis of a so-called functional or psychogenic disorder is not made merely on the basis of a negative physical examination. Certain interview technics are employed to explore the patient's emotional reactions and establish positively the presence of psychological conflicts which are related to somatic complaints. The dentist should be familiar with this general approach even if it need not be extended beyond the first-aid level which adequately meets the requirements of his own specialty.

The dentist's technic of personality appraisal must depend on his observations of the patient's verbal and nonverbal behavior. These observations begin with the first interview and constitute an integral part of the history taking. Walsh[2] offered a simple and orderly plan for carrying out oral diagnosis at four ascending levels. From the first inspection of the individual tooth or lesion, the examination is extended to include the entire masticatory system and its functioning. Attention is next directed to the general physical health of the patient, and then, last, to his manifest personality reactions. In practice these four levels of examination are carried out simultaneously. The stomatologist gets his clues as to the patient's personality type from the level of intelligence, the apparent emotional stability, the reaction to stress, and the revelation of psychosomatic factors. Dr. Walsh, incidentally, calls attention to the fact that patients may be intellectually superior and yet ignorant about dental care and possessed of extremely undesirable oral habits.

Visible evidence of emotional tension often appears during history taking. The nonverbal evidences include changes in facial expression, tremors, tics and vasomotor reactions. Verbal production may be marked by frequent return to a fixed theme and a tendency to bring in numerous unrelated concerns of the patient. There may be a noticeable tendency to

2. Walsh, J. P. A manual of stomatology. Christchurch, New Zealand, N. M. Peryer, Ltd., 1957.

blame the oral discomfort or disorder for the patient's whole life frustrations. The oral diagnostician, like the psychiatrist, should observe the apparent use the patient makes of his symptoms and note if through them he gains attention or consideration from key persons which would otherwise not be given. This well-known "secondary gain" from illness may give the patient a balance of power which he may not readily give up, despite adequate treatment for the underlying disorder. It is important to remember that illogical behavior and suffering can be maintained by powerful unconscious forces.

In the course of his examination the oral diagnostician will find it helpful to employ several specific methods of questioning which will aid in revealing the strength of subjective reactions. It must be kept in mind constantly that a patient's perception of pain may be quite distinct from his reaction to it. Neurotic patients in particular tend to describe, dramatize and elaborate this secondary reaction in great detail.

One device used by case history interviewers and psychotherapists can be particularly helpful to the oral diagnostician—the exploration of the symptom by the "when, what, where, who, how, why" line of questioning. For example, with the patient whose complaint of burning tongue is not explainable on an organic basis, the questioning might proceed in the following way:

Exactly when did you first become aware of this trouble?

What were you doing at the time?

What was going on around you?

What other personal and social factors may have influenced you at the time?

What makes the trouble worse, and what seems to help it?

Where did the pain start and where or to what other organs did it seem to go?

Who is particularly aware of your difficulty and who in your acquaintance may have had similar symptoms?

How does worry, strain or fatigue influence the trouble?

Why have you been unable to receive help?

■ *Management of the Patient*

A second method used by psychotherapists, based on the exploration of certain feelings which are revealed during the course of the history taking, is the technic of nondirective counseling. Amplifications of the patient's emotional reactions are obtained by such questions as, "Do you feel that the pain is related to other problems?" or "Do you feel that nervousness or worry is a factor?" The dental diagnostician uses this device to help the patient realize that his emotional states are related to his complaint, and vice versa. The achievement of such insight on the part of the patient is in itself a form of first-aid treatment. The patient's responses may reveal a life pattern of mounting tension, frustration of basic personality needs, and intolerable situations, in comparison to which his given complaint may be relatively insignificant. It is not in the province of the oral surgeon to explore conflicts below the conscious level, but he can give definite reassurance as to the absence of organic disease and in this way reduce one focus of the patient's anxiety. The further treatment of persisting complaints which arise from psychogenic conflicts must fall to the responsi-

bility of those trained in psychotherapy, and it may be necessary to inform the patient frankly of this fact.

Pain of psychogenic type is seldom confined to an exact anatomic distribution of the affected nerve supply. This is often observed in the neurotic patient who at first complains of exquisite pain in one area and on further examination is insensitive to stimulation of the same point while he is insisting that "it hurts the same way all over." The following are verbatim statements from a patient who had five alcohol injections and two partial resections of the lingual nerve for chronic pain in the left side of the jaw and tongue, all with little or no relief:

"It feels like my teeth are being torn out."

"The pain makes me want to scream."

"The more I thought the worse the pain got."

"Every time they did something for me it made the pain worse."

"As soon as I wake up in the morning the pain pops right into my tongue."

"When I start talking the whole tongue starts hurting."

"Every time I have something done I get real nervous."

"When you are nervous you have pain all over the mouth."

"I can't go on living this way."

"The pain was worse than ever yesterday because I didn't know what to do with myself."

"Every time I picked up them crutches the pain in my tongue would hurt." [After a sprained ankle.]

"I wanted to go out but I was afraid because it made the pain worse."

It is not to be expected that the oral surgeon and the neurosurgeon who both treated this patient on numerous occasions should have assumed all the responsibility of discovering the hidden psychogenic factors in her persisting complaints. However, clues such as those mentioned would certainly indicate that the patient's reaction to the illness frequently overshadowed the condition itself. This is sometimes referred to as "the language of the emotions." Psychiatric treatment of this particular patient revealed her to be of passive-aggressive personality type, frustrated in a childless existence with an obtuse and unresponsive husband who was impatient with her numerous demands for attention. It is perhaps not surprising that the presence of an impacted molar triggered an obsessive focus on pain in the jaw and that the ensuing severe emotional depression finally required hospitalization of the patient for electroshock and psychotherapy.

In the following case the differential diagnosis was even more difficult, and a precise formulation of the psychogenic factors eluded even the examining neuropsychiatrist. This patient also found relief through polysurgery.

CASE 1—A 30 year old male teacher complained of dull, aching pain of nine years' duration on the left side of the face. The pain originated at the canine fossa and radiated to the nose, left maxillary and orbital areas. It was brought on by flicking the muscles of the face and was intensified by eye movements. There was a history of a diving injury to the nasofrontal region associated with unconsciousness several years before the onset

of the pain. The patient had been under treatment by an ophthalmologist, who advised him to carry out eye exercises because of poor convergence of the left eye. The patient stated that these exercises aggravated the pain, as did fatigue and insomnia. A partial denture which he had had for a year was not worn because it also aggravated the pain.

At the patient's insistence the second bicuspid was removed, and for a time this gave partial relief. Referrals to other clinics in the hospital were essentially noncontributory and an electromyelogram was negative. A diagnosis of infraorbital nerve neuralgia was considered at first but later dropped.

The patient flatly refused a second appointment with a psychiatrist and prevailed on the oral surgeon to give him local treatment, which he insisted would relieve the pain. An infraorbital lidocaine nerve block gave immediate local relief, but the patient then complained of a muscle pull sensation over the left cuspid region. A second procedure consisting of a slight mucoperiosteal elevation again gave complete relief in the infraorbital region, but the patient soon returned complaining of tightness over the surface of the palate. The oral surgeon, against his better judgment, was again prevailed on to make a small incision in the palate. (This was now done entirely for the effect of suggestion.) The patient again stated he had immediate relief of the palate pain, but then reported that the pain had migrated anteriorly. He begged that the procedure be repeated up to the midline.

The surgeon became concerned over the patient's emotional dependence, and it was apparent that the patient was developing a definite polysurgical addiction. When finally confronted with the need for psychotherapy, the patient pleaded that he would be away for the summer and would have to postpone such appointments until he returned in the fall.

Had a skillful interviewer other than the surgeon been able to establish as good a rapport with this patient he might have explored the indications in the history that the patient's pain began when he had difficulty in obtaining a higher degree, and that his subsequent frustration in a minor teaching position made him vulnerable to unconscious dependence on his dental symptoms as an escape. As long as he continued to suffer what to him was a "respectable" type of illness, he was freed from the responsibility for his eye exercises and for wearing his dentures. Although the final outcome for this case is as yet undeterminable, it is obvious that further surgical manipulation is certainly not the treatment of choice.

Since Costen's description became known 25 years ago, the diagnosis of temporomandibular joint syndrome is generally considered when the dentist is consulted for unusual pain in the posterior part of the mouth, burning sensation of the tongue, and salivary changes. It is important that the dentist consider the psychogenic aspects of associated malocclusion and bruxism in arriving at a final diagnosis of such conditions. Moulton[3] reported that long-standing bruxism was a prominent symptom in at least half of 35 patients with temporomandibular joint pain. In the absence of proof of organic

3. Moulton, Ruth. Psychologic considerations in the treatment of occlusion. J. Pros. Den. 7:148 March 1957.

origin or anatomic joint involvement, it would be doubtful if reposition of the jaw alone would represent sufficient treatment. Certainly the psychological aspect of any associated habit disorders should be given due attention.

Bruxism is painful spasm from the overuse of jaw muscles, not only during the waking hours but often also while the patient is asleep. Leof[4] stated that the related habit of clamping the teeth is even more injurious than grinding. Although the patient may focus his demand for relief on the pain, the condition itself should be viewed as a habit disorder in which tension, anxiety, and unrealized aggression are released through the oral route. Psychoanalysts trace the source of such clamping and grinding habits to hostility and aggression which the patient is unable to express and which he is likely to minimize or deny when it is first brought to his attention. Treatment on the conscious level requires reduction of the occlusal stress through adequate training in muscle relaxation, and this requires considerable time.[4] The dentist's reassurance to the patient should include the inculcation of knowledge that the patient shares responsibility for part of the treatment. Some patients will require psychiatric referral and extended exploration of the underlying repressed hostile feelings.

Refusal of the patient to wear dentures even when they are properly fitted is a common challenge to the dentist's use of psychotherapeutic technics. After accurate determination of organic factors the dentist's management of the patient must extend beyond mere reassurances of the repeated negative findings on examination. By means of the case history method and nondirective probing he should be able to direct attention to other factors which influence the patient's use of the dentures as a scapegoat.

In some instances the oral surgeon will encounter personality limitations which make a compromise solution necessary.

CASE 2—One such instance is that of a 64 year old woman who was referred to an oral surgeon because of painful gums. Her teeth were all extracted eight years previously because she was "nervous" and it was thought that this would "improve her health." Three different prostheses were tried over the eight year period, but despite treatment by various dentists the patient continued to complain of inability to wear the dentures. When examined, the lower gums were soft and mobile and had a tender, irregular border. The mandibular alveolar process was grossly atrophic, and roentgenograms revealed extreme alveolar ridge resorption, along with osteoporosis of the mandible. A mandibular alveolectomy in which the sharp ridge and hyperplastic tissue were removed brought about no significant change in the patient's complaints. She had only a fourth grade education and was of simple intelligence with a defeatist attitude toward both her health and her future.

On one occasion she stated that pain in her shoulders was relieved somewhat by removing the dentures. Examination six months later revealed no tender areas, but the patient still complained obses-

4. Leof, M. Clamping and grinding habits; their relation to periodontal disease. J.A.D.A. 31:184 Feb. 1, 1944.

sively of uncomfortable dentures. It became apparent that her negative reaction to wearing the dentures had become a major fixation and that this had grown out of her long-standing sense of frustration and unhappiness.

■ *Summary and Discussion*

The dentist's plan of treatment in dealing with orodental neuroses will depend first on whether or not there is definite oral pathologic condition in need of surgical intervention. If a systematic examination reveals none, it is his task after reassuring the patient as to the negative findings to consider other factors which might influence the symptoms, habits or complaint. Considerable re-education and follow-up may be required at this point. It is here that the nondirective approach is helpful in exploring both the depth of the patient's concern and his acceptance of psychotherapy, as such need becomes apparent. An attempt to distinguish between the patient's perception of pain and his subjective reaction to it will assist in bringing the psychological element to conscious attention. This step is usually essential before the subject of psychiatric referral can be brought up in talking with the patient.

Occasionally the patient receives prompt relief by spontaneously correlating his orodental problem with some disturbing life situation, but this type of "transference cure" is, unfortunately, not the rule. When the disorder is obviously chronic and the cause is obscure, the dentist or physician should prepare for psychiatric referral by nondirective inquiry as to the patient's willingness to explore further the emotional aspects with a specialist in that field. The decision is thus placed in the patient's hands, and the dentist should indicate his willingness to contact the psychiatrist or psychotherapist at the point when the patient's concern over his problem overcomes his resistance or fear of undertaking psychiatric treatment.—*4038 Jackson Road.*

■ Education, Science and Religion

The teacher that I look for and await shall enunciate with more precision and universality, with piercing poetic insight those beautiful yet severe compensations that give to moral nature an aspect of mathematical science. He will not occupy himself in laboriously reanimating a historical religion, but in bringing men to God by showing them that He is, not was, and He speaks, not spoke.—*Ralph Waldo Emerson.*

Tic douloureux: permanent cure by injection of hot water into gasserian ganglion

■ *Rudolph Jaeger, M.D., Philadelphia*

It has long been known that the sharp stabbing pains of tic douloureux could be stopped permanently only by partial or complete destruction of the gasserian (trigeminal) ganglion or its sensory root between the ganglion and the brain inside the skull. By a highly technical, potentially hazardous, skull and brain operation, this destruction could be effected, but not without frequent paralysis of other important cranial nerves. A relatively high operative mortality and morbidity has attended the operation, even when performed by skilled surgeons with many years of experience in brain surgery.

A second method by which the pain has been stopped permanently was by injecting the ganglion with alcohol through the foramen ovale at the base of the skull. This technic was developed to a high degree of perfection many years ago by Wilfred Harris[1] who reported results achieved in 1,433 patients.

Alcohol injected into the cranial cavity, however, as is necessary for injecting the ganglion, even in fractional amounts, too frequently causes facial paralysis, as well as paralysis of the faculty of swallowing, or of talking and other undesirable side effects. A recent questionnaire sent to 52 leading neurosurgeons in this country disclosed only one who considered this technic to be a safe procedure or who uses it at the present time.

Although I have performed the major surgical procedure for hundreds of patients over more than 25 years, with great satisfaction to the patients and an operative mortality of about 2.5 per cent, I was always anxious and tense at the intricate operation for fear some minor slip in technic might cause a surgical disaster. This feeling was accentuated by the realization that tic douloureux never causes facial disfigurement, serious functional disturbances or death. It has always seemed to me that a simpler, safer method must be devised for destruction of a part or even all of the ganglion without the necessity of an operation of considerable magnitude, or the use of an irritating unpredictable dangerous chemical such as alcohol.

In 1951 I began experimenting on animals in the laboratory of neurosurgery at Jefferson Medical College with the production of partial or complete nerve cell lesions of the frontal lobes by the injection of boiling, and later with warm water (at 75° C.). The results were so satisfactory that I have used this method many times since to produce a tranquilized mental state and relieve intractable pain in patients with incurable cancer and other afflictions.

Professor of neurological surgery, Jefferson Medical College, chief, departments of neurosurgery, Jefferson and Wills Eye Hospitals.

1. Harris, W. Analysis of 1,433 cases of paroxysmal trigeminal neuralgia, (trigeminal tic) and the end result of gasserian alcohol injection. Brain 63:209 Sept. 1940.

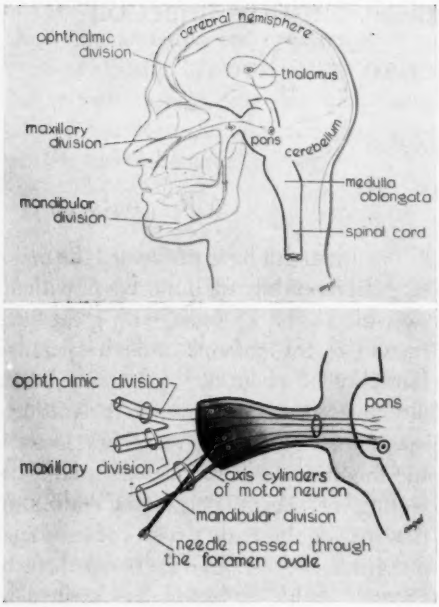


Fig. 1—Above: General anatomy of gasserian ganglion and its cerebral connection. The thousands of nerve cells of which ganglion is composed are represented by a single neurone. Below: Arrangement of nerve cells in ganglion. Note darkened space which is filled with cerebrospinal fluid

The next logical step was to inject hot water into the gasserian ganglion for its partial or complete destruction through the foramen ovale. My first patient was an elderly woman—too old and feeble to withstand operation—who had had peripheral branch alcohol injections over a period of years at my hands with gradually shortening intervals of relief between the atrocious attacks of pain. Under thiopental sodium anesthesia and x-ray guidance of the needle tip, I stopped her pain and produced only a mild sensory loss in the side of the face at its former site by injecting 1 cc. of boiling water into the ganglion. She is well to this day and has had no more tic pain.

Since that time, 130 patients have been treated in the same way and with the same results. The preliminary observations after 16 injections were published in *Science*.[2] A later report[3] on 20 patients was given in *Geriatrics*. Recently a follow-up on 100 patients with tic douloureux who had been treated by this method was published.[4]

■ *Reasons for Relief Obtained by Hot Water Injection*

Anatomically the vital center of the nerves carrying all types of sensation from the face, eyes, upper and lower jaws and the tongue is in the nerve cell bodies in the gasserian ganglion structure. From this location each nerve cell gives off a single axone which divides into two branches, one of which extends peripherally to carry sensation from the facial structures to the ganglion, the other passes from the ganglion to the brain (Fig. 1, above). If the nerve cell, which is the life center of this mechanism, is destroyed or attenuated in any way by heating, crushing, or chemical action, its power to carry painful stimuli to the brain is permanently reduced or completely paralyzed, depending on the degree of nerve cell substance alteration.

If, however, the ophthalmic, maxillary or mandibular nerves are killed by heat, alcohol, or cutting, the nerve will

2. Jaeger, R. Method for controlling pain of face and jaws caused by tic douloureux. Science 120:466 Sept. 17, 1954.

3. Jaeger, R. Relief of tic douloureux (trigeminal tic) and other pains of the fifth cranial nerve by injection of hot water into the gasserian ganglion. J. Am. Geriat. Soc. 3:416 June 1955.

4. Jaeger, R. Permanent relief of tic douloureux by gasserian ganglion injection of hot water. A.M.A. Arch. Neurol. & Psychiatry 77:1 Jan. 1957.

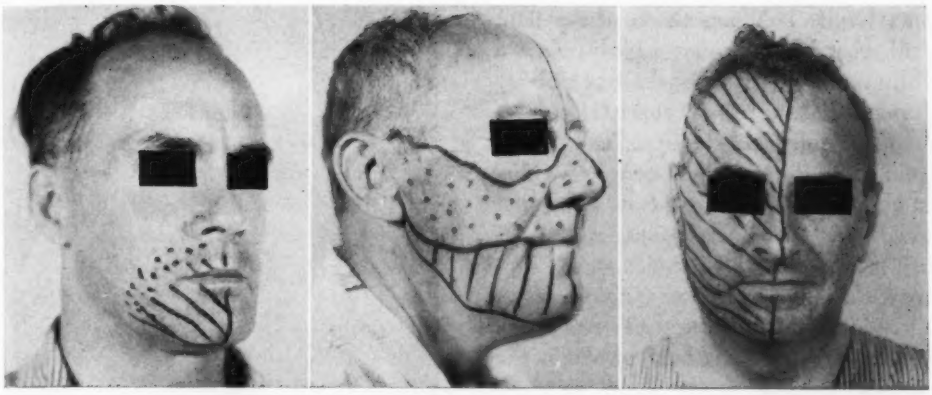


Fig. 2—Left: Minimal sensory loss in face for tic of mandibular division after hot water injection. Cross marks indicate complete sensory loss. Stippling is over area where sensation is present but diminished. Center: Injection result in patient with tic in maxillary and mandibular divisions. Right: Area of anesthesia that may be necessary for tic pains of all three divisions of trigeminal ganglion

regenerate from the viable nerve cells which lie deeper—within the ganglion (Fig. 1, below). Thus the relief from tic pain after branch destruction is only temporary, whereas destruction of the nerve cell body assures permanent loss of function in the entire neurone (nerve cell, axion, and dendrites). Therefore, when hot water is injected into the cluster of ganglia cells, which make up the bulk of the large semilunar shaped ganglion, death or weakening of these cells occurs and there is a complete loss or diminished sensation in the face which is permanent. By selecting cells for injection in those parts of the ganglion which have fibers passing to the pain afflicted portion of the face, a sensory loss will result only in that part of the face afflicted with pain (Fig. 2).

■ *Hot Water Injection Technic*

The hot water injection is carried through in the hospital under very light thiopental sodium anesthesia with the head resting on the cassette holder of a special (Franklin) neurosurgical x-ray unit (Fig. 3). When the patient is barely unconscious, an 18 gauge spinal needle is passed through the cheek at the corner of the mouth. It is advanced between the maxilla and mandible toward the anatomic location of the foramen ovale (Fig. 4).

When the needle strikes the base of the skull, the precise position of the point in relation to the foramen is located on the x-ray film. If not precisely placed in it, the needle is moved so as to pass through this skull opening. With patience and some maneuvering, the needle can be felt to pass through the foramen. It must be passed only about 10 mm. through it and never more than 17 mm. Cerebrospinal fluid may escape when the needle stylet is withdrawn. If so, only 0.5 cc. of water at 80° C. is injected, and the patient's face is then tested with a pinprick to determine the degree of sensory loss at the pain

site. Under light anesthesia, the patient will react by squirming slightly when a fully sensitive portion of the face or body is pricked. If the painful area has not been numbed sufficiently to produce permanent relief, the injection is repeated with a larger quantity of water at the same temperature or even at the boiling point.

At no time is it permissible to inject more than 2.5 cc. of water at a single dose. Occasionally it is necessary to repeat the injection a day or so later to obtain the desired result. It is not often necessary to produce complete facial anesthesia to stop the pain of tic douloureux. It is usually sufficient to numb slightly only that part of the face where the major discomfort is located. It is true that the pain may in future years extend to other branches that have not been numbed, but if this happens the injection can be repeated subsequently so as to produce numbness in the extended location. Since the risk of this procedure at any age is so slight and can be done so painlessly, there is no reason for trying to anesthetize the entire side of the face.

Fig. 4—Note point of needle at foramen ovale which leads to gasserian ganglion

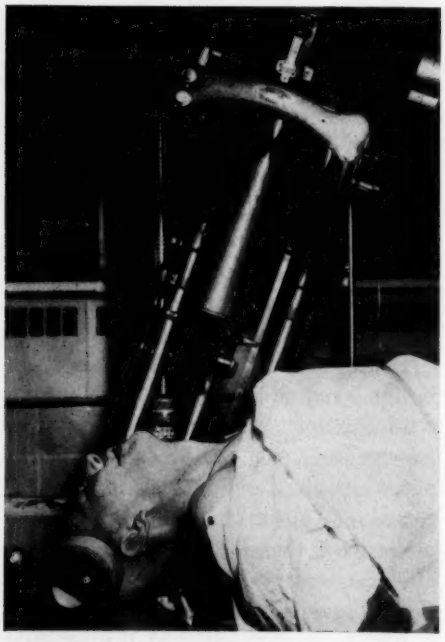


Fig. 3—Position of head on x-ray apparatus for precision identification of needle. Note hub of needle at corner of mouth

Since this is a highly technical procedure involving entering the cranial cavity and injecting only the gasserian ganglion cells, its use should be restricted to neurosurgeons, since they are the only ones trained and experienced in the extremely complicated anatomy and physiology in the region of the fifth cranial nerve structures. I am certain that this treatment, if given by a neurosurgeon, no matter how inexperienced he may be, will produce a greater number of cures of tic douloureux in patients with fewer

deaths and complications than will be produced by any other method that is now available.

A major pitfall in treating tic douloureux is in diagnosing the condition correctly. The sharp pains of migraine may be indistinguishable from that of true tic. Migraine pain subsides spontaneously and is amenable to relief by medical methods; to operate or inject for it is useless. Other facial pains closely resemble true tic but are not cured by treating the trigeminal nerve. These have been called atypical facial neuralgia because of ignorance regarding their true nature. The problems of some of these patients are psychiatric, and occasionally such patients require hot water injections of the frontal lobe of the brain to obtain relief from their suffering.

■ *Results*

In 130 patients who have had ganglion injections, there have been no deaths or near deaths and no facial paralysis. No other method for the permanent cure of tic douloureux comes near matching this record. There is temporary paralysis of the muscles of mastication on the injected side in many instances; this disappears in three to five months. Since it is the motor nerve trunk that is paralyzed and not the life-giving cell body, regeneration of this nerve is almost certain. Therefore, it is perfectly safe subsequently to inject the opposite ganglion for tic pain in the other side of the face, should it occur there. There is no interference with the chewing of food or the retention of dentures.

Bilateral tic douloureux is treated by injecting first the most painful side. If paralysis of the masseter muscle occurs, injection of the other side awaits return of this muscle's strength, then the other side is injected. After regeneration of both motor roots there will be no disturbance of mastication.

Six per cent of my patients have had temporary weakness of the muscles which rotate the eye. This leaves when the nerve regenerates. Eye complications can occur, as in all past treatments for this disorder, if great care is not given to those few persons where corneal anesthesia is present. Prompt and appropriate care of the eye by a skilled neurosurgeon can prevent a major problem from developing.

■ *Summary*

A new method has been developed for curing permanently the pain of tic douloureux by injecting the gasserian ganglion with hot water while the patients are under light anesthesia and x-ray visualization. This procedure is based on well known physiologic and anatomic knowledge and merely uses a new, relatively harmless agent (hot water) to effect relief from the pain. Major brain surgery is seldom necessary nowadays for relief from the facial pain of tic douloureux or cancer.

Proliferating benign and malignant epithelial lesions of the oral cavity

■ *Lauren V. Ackerman, M.D., and Malcolm H. McGavran, M.D., St. Louis*

Diagnosis of proliferative lesions of the oral mucosa is a difficult problem especially when the lesion is associated with infection. Careful, meticulous microscopic study of the biopsy specimen is an important factor in determining how radical therapy must be to offer high promise of a cure. Periodic postoperative followup of carcinomas of the mouth is imperative, since patients who have had an initial cure have a definite tendency to develop new malignancies in the remaining oral mucosa.

Cancer of the oral cavity has many clinical and pathologic manifestations. The cure of the individual tumor depends on many factors including location, microscopic pattern, time of diagnosis in relation to duration of the disease, and exactness of diagnosis. The treatment of these cancers may be surgical, roentgenotherapeutic or a combination of both methods. This paper is mainly concerned with emphasizing diagnosis, different growth patterns, and methods of origin of the cancer.

Oral surgeons obviously have great responsibility in the detection of cancer of the oral cavity. It is their responsibility to take a biopsy specimen and send it to a competent pathologist. From the biopsy and an adequate study of the patient, a decision can be made as to proper treatment.

■ *The Biopsy Specimen*

It is obvious that if the tissue for biopsy is taken from the center of an ulcerative oral lesion, the material obtained is often not diagnostic since it may show only inflammatory cells. If an ulcer is present, the best biopsy specimen is obtained with a cold knife, taking a thin wedge of tissue from the margin of the ulcer and carrying it deep to include the margin of the ulcer. Thus it should include a thin, deep section of normal and abnormal tissue. If cautery is used, it causes charring and burning of the tissue which makes interpretation difficult, if not impossible, and which obscures details at the margins.

Certain lesions such as salivary gland tumors, most common in zones where the salivary gland tissue is most prominent, also may occur in any location within the oral cavity, and it may be difficult to obtain a good biopsy specimen. These lesions frequently are benign and usually do not

Presented at the thirty-ninth annual meeting of the American Society of Oral Surgeons, Miami Beach, Fla., October 31, 1957.

From the division of surgical pathology, Washington University School of Medicine and the Barnard Skin and Cancer Hospital.

erupt through the mucous membrane but form a mass beneath the intact mucosa. In one instance a patient was referred to us with a presumptive diagnosis of a salivary gland tumor of the hard palate. Two rather superficial biopsy specimens revealed no evidence of tumor. A third, deeper biopsy section revealed a benign mixed tumor lying almost entirely within the hard palate.

It is also particularly difficult to obtain good sections for biopsy of cancers arising near the base of the tongue.

CASE 1—A 56 year old white man had an area of superficial ulceration and prominent induration at the base of the tongue. Biopsy was carried out. The pathologist made a diagnosis of chronic inflammatory changes.

The biopsy specimen was an excellent one and showed evidence of minimal chronic inflammation and some fibrosis. There were two small fragments of tissue present which the pathologist apparently did not feel were significant. However, these two fragments showed relatively undifferentiated squamous carcinoma infiltrating between muscle bundles (Fig. 1).

COMMENT—This case demonstrates the difficulty in obtaining a good biopsy specimen of a carcinoma of the base of the tongue. The tumor often infiltrates rather deeply and grows beneath intact overlying epithelium, so that in removing the specimen it is possible to miss the cancer completely. Also the area of cancer present may be so small that it may be missed by the pathologist. In this instance also, there was apparent involvement of the lymphatics. A small nest of tumor cells could be identified just below the relatively normal epithelium.

■ *Pseudoepitheliomatous Hyperplasia*

A tumorlike mass within the oral cavity may be caused by a foreign body, infection, a poorly fitting denture or a sharp, jagged tooth, or may not be a neoplasm at all. The reaction of the epithelium seen grossly or microscopically may be mistaken for cancer. Naturally a biopsy specimen is taken from such lesions. The difficulty of correct interpretation of such changes is not generally recognized.

The next case illustrates maximal nonneoplastic epithelial proliferation.

CASE 2—The patient, a 75 year old man, was first seen on January 23, 1957. He had noted a swelling on the right upper gingiva six months previously. On January 30 he was found to have a proliferating tumor involving the right upper gingiva, right cheek and anterior tonsillar pillar. The lesion apparently was fixed to the mandible. There was an enlarged cervical lymph node on the same side. Tissue was removed from the lesion for biopsy, and a diagnosis of well-differentiated epidermoid carcinoma was made (Fig. 2).

Roentgenographic examination showed a 3 cm. area of destruction involving the alveolar ridge anterior to the mandibular angle with a soft tissue mass (Fig. 3). The area of destruction was 1 cm. deep and irregular in outline. This was diagnosed from the roentgenogram as neoplastic destruction of the mandible with carcinoma extending into the surrounding soft tissue. The lesion was ex-

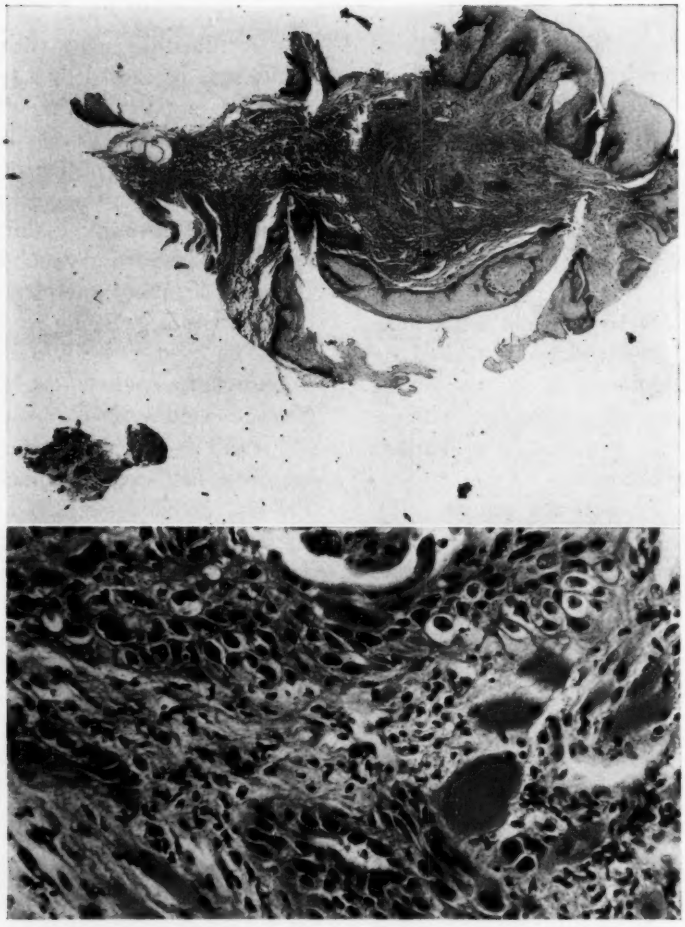


Fig. 1—Case 1. Above: Biopsy material from lesion at base of tongue. Large biopsy section shows no evidence of carcinoma but tiny biopsy section in lower left contains carcinoma. Below: Photomicrograh of small biopsy section shown above. Lesion shows poorly differentiated squamous tumor cells growing between striate muscle bundles

cised and again a microscopic diagnosis of carcinoma was made. Radon seeds were inserted in the local region. Another roentgenogram on April 5 showed no further destruction. Four biopsy specimens were taken from the scar within the oral cavity in the region of the previous excision. These showed no evidence of tumor.

On April 15 a jaw-neck dissection with complete disarticulation of the mandible was carried out. Fifty-four lymph nodes were found which showed no evidence of tumor, and no tumor could be found beneath the oral mucosa.

Prominent inflammation in the biopsy specimen of the primary lesion extended between the muscle bundles, and this was undoubtedly responsible for fixation to the mandible (Fig. 4). Erosion of the mandible as described by the roentgenologist also was related to inflammation. Prominent alterations in the normal tissue were related to the radon seeds that had been inserted.

COMMENT—A careful review of the original biopsy sections of this case convinces us that this never was cancer but merely extreme pseudoepitheliomatous hyperplasia. The microscopic pattern shows well-differentiated epithelium associated with the severe chronic inflammation extending deep within the muscle. A few separate nests of squamous epithelium are also present. However, they are very well differentiated, and their isolation is probably due to the plane of section. Certainly this zone should have been locally excised. The roentgenologist interpreted the soft tissue mass and the destruction of the mandible as an invasive cancer. The surgeon too should have been alerted, perhaps, that this was not cancer because of the four negative biopsies before neck dissection. The only indicated treatment, therefore, was local excision of the lesion.

This sequence of events was most unfortunate, but such extreme pseudoepitheliomatous changes are observed rarely. As yet we have seen only one other instance, almost the same, on which several pathologists made erroneous diagnoses. The history is as follows:

CASE 3—A 77 year old white man, while having some dental work done, was noted to have a sore on the right side of his mouth. This involved the right buccal mucosa and spread to involve the right side of the mandibular ridge. The condition noted in the two biopsy sections was called "epidermoid carcinoma." Roentgenograms of the mandible did not reveal bone destruction. No palpable nodes were present in the neck. After considerable medical evaluation for heart disease and emphysema, removal of the right half of the mandible and a radical neck dissection were carried out.

Pathological examination of the specimen failed to reveal any invasion of the mandible or lymph nodes. The primary lesion showed extreme pseudoepitheliomatous hyperplasia with absent basement membrane and an extremely prominent inflammatory reaction which extended down to involve the muscle (Fig. 5). The squamous epithelium was well differentiated, and the prominent inflammatory component blurred the pattern so that the erroneous diagnosis of cancer was not difficult to make.

Fig. 2—Case 2. Extremely prominent pseudoepitheliomatous hyperplasia with deep extension

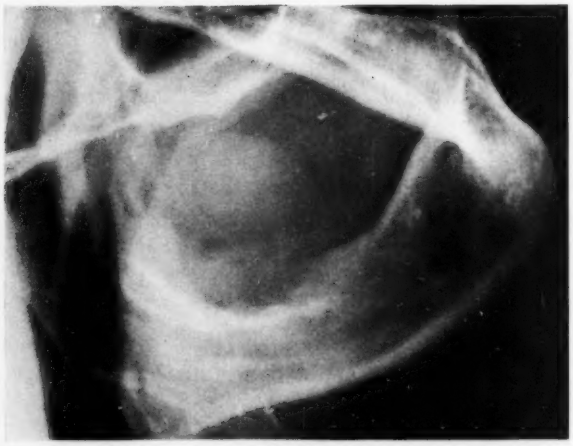


Fig. 3—Case 2. Local destruction of mandible in the presence of a soft tissue mass

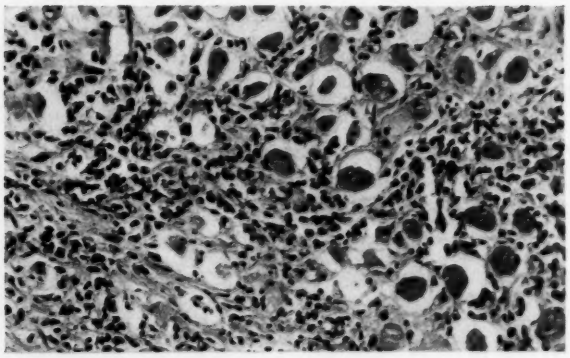


Fig. 4—Case 2. Photomicrograph of inflammatory process extending down between muscle bundles

COMMENT—This case also represents extreme pseudoepitheliomatous hyperplasia complicated by prominent infection which obscured the pathologic and clinical findings. Obviously all that was indicated was local excision of the soft tissue mass.

■ *Keratoacanthoma*

Another lesion which occurs primarily on skin surfaces has been described under many names such as "molluscum sebaceum," "molluscum pseudocarcinomatosum," and "self-healing squamous epidermoid carcinoma."[1-3] We prefer the term "keratoacanthoma."

This lesion should be of concern to both the clinician and the pathologist because it is confused frequently with epidermoid carcinoma. We have seen it on the lip where clinically it was confused with cancer but, with the excision and microscopic study, the correct diagnosis of keratoacanthoma was made.

On the skin it appears on the arms, face and chest and may occur from childhood to senescence. In rare instances it is multiple.

The most fascinating aspect of this lesion is its ability to regress completely without treatment. It may develop from a small papule to its full size in from six to eight weeks and then begins to regress, finally leaving a small scar. The fully developed lesion has a distinctive structure with a central crater, usually interpreted as an ulcer, and filled with white to gray keratogenous debris with a firm border of pearly epithelium from which the intact marginal epidermis slopes to the base. The microscopic sections demonstrate the characteristic pattern. The wall of the crater-shaped lesion is formed of a proliferating, well-differentiated squamous epithelium that desquamates its keratin into the center, forming the plug (Fig. 6). Peripherally the lesion is well defined and usually associated with a heavy lymphocytic infiltrate.

These lesions never have the invasive characteristics of epidermoid carcinoma, for example, nerve sheath, lymphatic or muscle invasion. The principal differences from epidermoid carcinoma consist of (1) a short period of growth, (2) the gross appearance, and (3) the microscopic pattern that lacks the ultimate criteria of malignancy. The biopsy section may be impossible to interpret correctly if only a small margin and considerable keratin are included in the specimen.

■ *Verrucous Hyperplasia and Verrucous Carcinoma*

Verrucous hyperplasia and verrucous carcinoma represent epithelial proliferative alterations which occur within the oral cavity. Verrucous carcinoma is a variant of epidermoid carcinoma.[4] It is important to be able to recognize this lesion clinically and microscopically, for it has a classic evolution and an excellent prognosis. The two cases to be reported represent variations in the clinical evolution.

1. Dunn, J. S., and Smith, J. F. Self-healing primary squamous carcinoma of skin. Brit. J. Dermat. 46:519 Dec. 1934.

2. Witten, V. H., and Zak, F. G. Multiple, primary, self-healing prickle-cell epithelioma of skin. Cancer 5:539 May 1952.

3. Burman, S. O.; Buckwalter, J. A., and Carter, J. R. Molluscum pseudocarcinomatosum. Surg., Gyn. & Obst. 102: 574 May 1956.

4. Ackerman, L. V. Verrucous carcinoma of the oral cavity. Surgery 23:670 April 1948.

CASE 4—A 63 year old farmer had been treated for a verrucous lesion of the buccal mucosa in 1927. The lesion had been excised and a radical jaw-neck dissection also had been carried out. The lesion had been entirely in the soft tissue and could have been designated as either verrucous hyperplasia or possibly early verrucous carcinoma.

The patient did not return for follow-up until 30 years later in April 1957, when he entered the tumor clinic with an extensive verrucous lesion of the hard palate. Clinically this was thought to be an advanced epidermoid carcinoma even after biopsy. It was adequately excised locally and was again entirely within the soft tissue. The mass measured 6 by 6 by 1 to 3 cm. (Fig. 7). In August he returned with a recurrence of this lesion, which

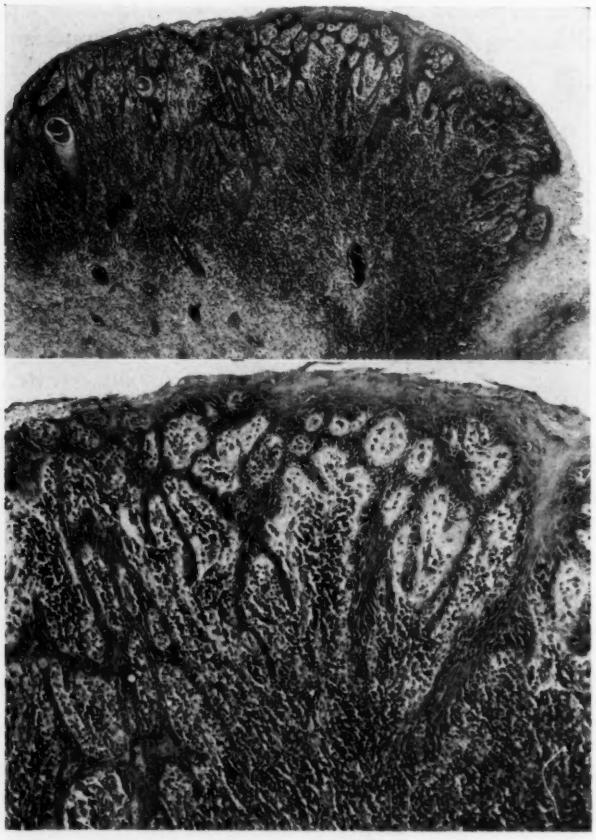


Fig. 5—Case 3. Above: Pseudoepitheliomatous lesion with prominent downgrowth of epithelium. Below: Photomicrograph of lesion shown above, which shows detail of pseudoepitheliomatous proliferation

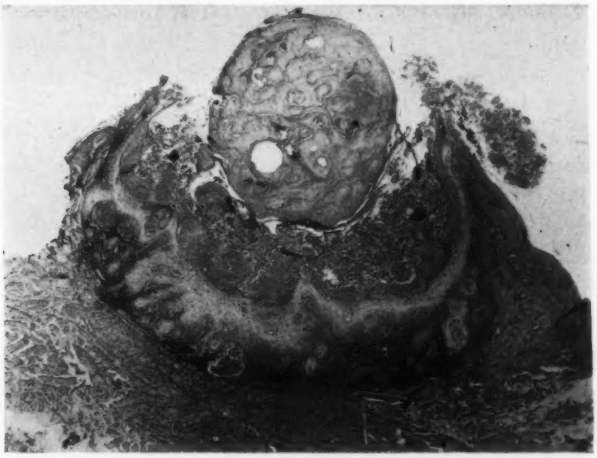


Fig. 6—Characteristic keratoacanthoma excised from vermilion border of lower lip of man age 47. Note cup-shaped pattern and sharp circumscription with well-differentiated epithelium

measured about 1 by 1.5 by 2 cm. It was locally excised and again diagnosed as verrucous hyperplasia.

COMMENT—This patient had an extensive, impressive verrucous lesion of the buccal mucosa and the hard palate. The case demonstrates how extensive the locally invasive process can be. In spite of the fact that this tumor had extended so widely, locally it still maintained its distinctive pattern, and lymph node metastases have not developed.

This type of carcinoma, which is probably best designated epidermoid carcinoma of the verrucous type, is more commonly found on the buccal and lower gingival tissues as shown in a study of 37 cases at the Ellis Fischel State Cancer Hospital. Only one patient had metastatic disease on admission, and in two other patients local metastases appeared with simultaneous local recrudescence of the primary tumor.[5]

The knowledge that this lesion is well differentiated, that it has a distinctive microscopic pattern, that it can locally invade contiguous structures but practically never metastasizes, is of great importance in diagnosis and treatment.

It is obvious that the rather innocuous looking microscopic pattern will be missed by pathologists not familiar with the lesion. We have seen a patient who had a huge tumor with extensive destruction of the maxilla, hard palate and soft tissue. The biopsy specimen had a deceptive appearance; however, the lesion was a classic verrucous carcinoma (Fig. 8). The surgeon excised this tumor, and in all sections including involved bone the same

5. Ackerman, L. V., and Johnson, R. Present-day concepts of intraoral histopathology. Proceedings, Second National Cancer Conference, vol. 1. New York, American Cancer Society, Inc., 1952, p. 403-414.

pattern was maintained. There were no lymph node metastases.

Furthermore, surgeons may easily mistake this lesion for a much more virulent form of squamous cancer and may do one of two things incorrectly: the surgeon may think the disease is so far advanced that nothing can be done; or he may combine local excision with radical neck dissection.

The correct alternative should be as follows: Once the lesion has been recognized, roentgenograms should be taken to see if bone is invaded. The lesion can destroy the mandible or maxilla by direct extension. If bone is involved, the lesion should be excised in continuity with the invaded bone. If bone destruction is shown roentgenographically, it will be found pathologically. If bone involvement

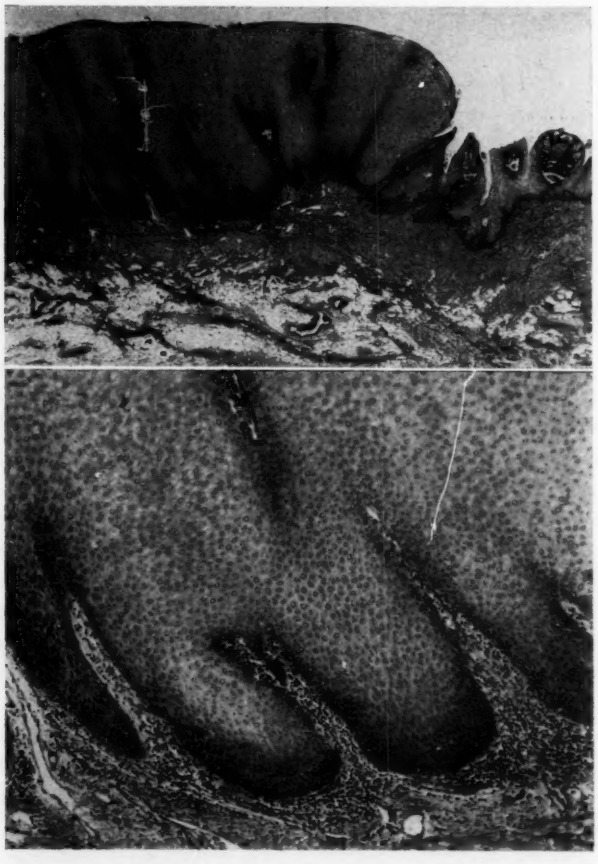


Fig. 7—Case 4. Above: Verrucous lesion from hard palate shows area of transition between hyperkeratotic epithelium and prominent verrucous hyperplasia. Below: High power view of lesion shown above. Note broad fronds and sharp demarcation

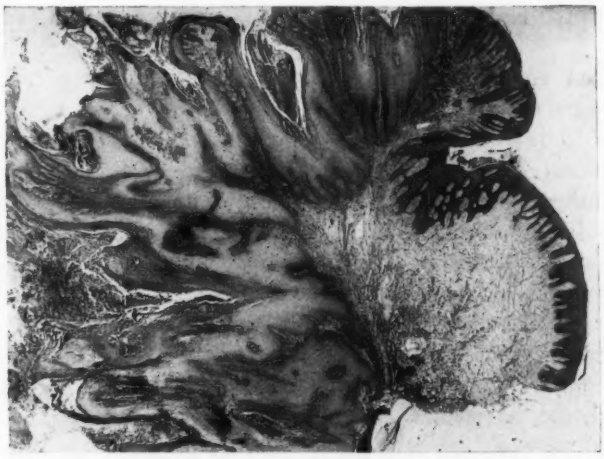


Fig. 8—Typical verrucous carcinoma, well delimited, showing characteristic prominent fronds and well-differentiated epithelium

is not shown roentgenographically, in a few rare instances involvement will be found pathologically.

We do not feel that radical neck dissection is indicated for verrucous carcinoma except under unusual circumstances, for lymph node involvement is uncommon. In patients with verrucous carcinoma death occurs from intercurrent disease rather than from distant metastases or extensive local recurrence. In fact, we have never seen a patient with this condition die with distant metastases.

■ *Epidermoid Carcinoma in Situ of the Oral Cavity*

We have made a considerable study of epidermoid carcinoma in situ of the oral cavity and feel there are many points of similarity between this lesion in this location with carcinoma in situ of the cervix. Before the clinical implications of the diagnosis of carcinoma in situ are considered, the pathological criteria for diagnosis should be defined. Certain epithelial alterations are not carcinoma in situ, and we have many slides referred to us with the diagnosis of carcinoma in situ with which we cannot agree.

The criteria for the diagnosis include complete disorganization of the cells throughout all layers of the lining epithelium. The basement membrane is intact, and individual cells show extreme variation in size and shape with many mitotic figures both normal and abnormal (Fig. 9). This process can occur as an abrupt or gradual transition from the normal lining epithelium of the oral cavity. The changes can be superficial or can extend down the ducts of the mucous glands that empty on the surface. Such extension to involve the ductal epithelium is not diagnosed as invasive carcinoma. Invasion of ducts of mucous glands and surface involvement also occur in patients with car-

cinoma in situ of the larynx and uterine cervix.

The clinician and the pathologist would like answers to many questions. These include (1) how often does invasive cancer occur from pre-existing epidermoid carcinoma in situ? (2) if invasive epidermoid carcinoma is present, how frequently does the margin of the lesion show epidermoid carcinoma in situ? (3) how frequently are there multiple foci of origin? and (4) if the biopsy specimen does not show invasion, what treatment, if any, should be given? These questions will be answered partially by the discussion of the cases that follow.

CASE 5—A 28 year old married woman had been treated by a dentist for approximately five months because of soreness in the region of the left upper gingiva. The lesion was unimpressive on clinical examination, and the dentist took a biopsy specimen simply because the condition had not improved under local therapy (Fig. 10). The biopsy, however, showed epidermoid carcinoma in situ and invasive tumor. Roentgenographic examination was made April 11, 1957, and showed no apparent evidence of bone involvement.

A portion of the maxilla with the upper central incisors and left lateral incisor was removed April 12. In the course of the operation, a node was felt in the upper cervical region. Frozen section of this node showed metastatic epidermoid carcinoma. Forty-eight other lymph nodes were found which were negative. One of the margins of the excised portion of the maxilla demonstrated tumor. A week later the patient had an additional portion of the maxilla removed, and the margins were free from cancer. This patient again developed an enlarged lymph node, this time on the opposite side, which showed complete replacement with epidermoid carcinoma within which there were secondary cystic changes. A biopsy was performed June 27 and an upper neck dissection was performed July 1. Fourteen additional lymph nodes were negative.

COMMENT—This case involved carcinoma in situ at the margin of an invasive epidermoid carcinoma. The situation was discouraging because clinically the process appeared to be benign whereas cancer was found on biopsy. The roentgenologist saw no evidence of bone involvement, yet at the time of the first operation there was definite evidence of such involvement. In this patient the disease has had a rapid progression.

CASE 6—The patient, a 69 year old man, had a six months' history of progressive enlargement of a right submandibular lymph node. Within the oral cavity the floor of the mouth showed a slightly raised region of leukoplakia. The biopsy specimen demonstrated classic epidermoid carcinoma in situ (Fig. 11). Needle biopsy of the lymph node was performed and demonstrated metastatic epidermoid carcinoma.

In spite of the fact that there was no evidence of invasive cancer in the biopsy of the lesion of the floor of the mouth, a partial mandibulectomy and radical right-neck dissection were carried out. The examination of this specimen showed an area of obvious invasive carcinoma associated with lateral extension of carcinoma

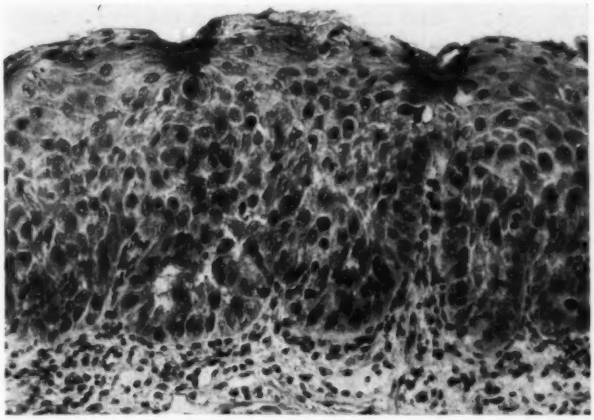


Fig. 9—Classic epidermoid carcinoma in situ. Note intact basement membrane and neoplastic replacement through all layers

Fig. 10—Case 5. Gingiva in patient with carcinoma

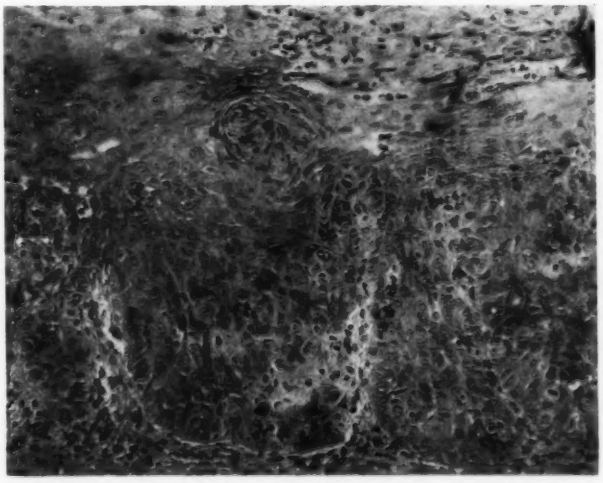


Fig. 11—Case 6. Epidermoid carcinoma in situ. Note complete disorganization of layers with innumerable mitotic figures, and intact basement membrane

in situ. The margins were free from evidence of tumor. One out of 59 lymph nodes was involved by tumor.

COMMENT—We believe that without definite invasion of carcinoma in situ beyond the basement membrane there cannot be lymph node metastases, for, as far as we know, there are no lymphatics in the mucosal epithelium. Therefore, in this patient, as was suspected, the carcinoma in situ of the floor of the mouth was associated with invasive cancer.

We have been impressed by the lateral extent of carcinoma in situ frequently appearing in patients with invasive cancer. Slaughter and co-workers[6] stressed this factor and have emphasized that this lateral involvement of the mucosa extends a much greater distance than the invasion does in depth.

The presence of such associated epidermoid carcinoma in situ has clinical implications from the standpoint of treatment. It has not been rare in the past for patients with oral cavity lesions to have local excision of an invasive carcinoma with a wide margin of apparently normal epithelium surrounding the lesion seen grossly. However, microscopically, epidermoid carcinoma in situ extended laterally to the margins of the excision. Later these patients developed invasive cancer in the region of the previous excision. Radiation therapists in planning treatment probably also do not consider this lateral surface extension carcinoma when they are planning their fields of treatment.

We have been impressed by the great variation in the speed of the evolution of carcinoma in situ. If a patient has one cancer of the oral cavity he has a greater chance of developing an additional cancer. These new cancers frequently develop in the same site as the first cancer. Patients may have multiple simultaneous lesions or there may be a short or long interval between cure of one cancer and the development of a second neoplasm.[7]

We believe that invasive cancer of the oral cavity is frequently associated with epidermoid carcinoma in situ and that there is a good chance that the invasive cancer often arises from such preexisting epithelial changes. We also believe that whatever the carcinogenic agent is that is responsible for such alterations, it has also made the rest of the oral cavity mucosa susceptible to epithelial deviations from the normal. This theory can be well exploited in the treatment of cancer of the cervix where it is known that carcinoma in situ may have multiple foci of origin and may extend to the vaginal cuff. In carcinoma in situ of the cervix it is feasible to remove the uterus and a wide cuff of vaginal epithelium. However, if such changes occur within the oral cavity, it is not possible to treat the mucosa of the entire oral cavity by surgery or roentgenotherapy. When focal invasive cancer is present, it must be treated with the consideration that a fairly wide area surrounding the cancer may show epithelial alterations. As treatment of epidermoid cancer of the oral cavity becomes more effective in locally controlling such lesions, it is certain that the number of multiple

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cancers of the oral cavity reported will increase.

■ *Summary*

1. Nonneoplastic epithelial proliferation of the oral cavity associated with infection particularly and with multiple other causes may cause local lesions which clinically, roentgenographically and microscopically can be and are confused with cancer.

2. The verrucous variant of epidermoid cancer has a distinctive evolution, gross and microscopic pattern and can often be treated effectively by local excision. This type of epidermoid cancer may involve contiguous structures including bone and soft tissue. This does not preclude cure, for lymph node metastases in this variant occur rarely.

3. Epidermoid carcinoma in situ is undoubtedly the microscopic change which often precedes invasive cancer. This microscopic change frequently is prominent around an invasive cancer. This fact must be considered in planning adequate surgical and roentgenographic treatment. The speed of evolution of this lesion from intraepithelial to invasive cancer is extremely variable.

4. Multiple cancers of the oral cavity are certain to increase in frequency, for as the effective therapy controls or cures the local lesions, other cancers will arise in the remaining oral cavity mucosa. Therefore, follow-up of patients cured of one cancer of the oral cavity must be made because of their increased chance of developing a second cancer.

■ Radiation Syndrome

Only knowledge can help to dispel the many uncertainties and misconceptions surrounding the radiation problem. Exposure of the whole body, or of a large part of it, to sufficient amounts of penetrating ionizing radiation induces in man the acute radiation syndrome. Clinical course and outcome of radiation syndrome are determined, in essence, by two factors: dose and individual susceptibility. Since most of the figures concerning incidence and severity of radiation-induced injury must be based largely on extrapolations and estimations, their value is necessarily provisional and subject to revision when additional information becomes available. Nevertheless, the following broad statements seem to be rather well supported. Air doses up to 100 r will be subthreshold for the acute radiation syndrome, and will be, therefore, of no concern in emergency situations. In the dose range between 100 and 200 r, the acute radiation syndrome, if it develops at all, will proceed in such a mild form that it can be handled ambulatory. The hospitalization threshold, an important concept defined as that dose level beyond which hospitalization becomes necessary for an appreciable number of persons, lies approximately at 200 r. Between 200 and 400 r—perhaps even 500 r—the acute radiation syndrome will be clinically significant and will occur in its hematopoietic form, displaying a characteristic time course almost independent of dose. All facts available, however, disprove the fatalistic or pessimistic approach frequently encountered.—*H. B. Gerstner, Acute Radiation Syndrome in Man. U. S. Armed Forces M. J. March 1958.*

Exfoliative cytology as a diagnostic aid in the detection of oral neoplasms

■ *Henry C. Sandler,* D.M.D., M.P.H., and S. Sigmund Stahl,† D.D.S., M.S., Brooklyn, N.Y.*

A study was undertaken to determine if malignant oral lesions could be detected by examination of smears as contrasted with actual biopsies. Fifty-one patients were studied for whom both smears and biopsies were available. In 47 instances (92 per cent) there was an accurate correlation between the two methods of testing for malignancy. Four patients with normal smears had biopsy evidence of carcinoma. In two instances where smears had been suggestive of malignancy when the biopsy had been negative, malignancy was proved by additional biopsies.

Although biopsy is the diagnostic procedure of choice, there are many clinical situations in which biopsy may not be feasible. In these circumstances, a smear of the exfoliated surface cells may be helpful.

The diagnostic criteria of malignancy of exfoliated cells, developed over the past century,[1] are widely used for cancer detection. However, interest has been directed primarily toward the exfoliated cells derived from comparatively inaccessible anatomic regions where cryptic malignant lesions are all too common and biopsies are often impractical; that is, the male and female genital systems, the respiratory and digestive systems and the breast. Normal cytologic diagnosis of the oral mucous membranes has been undertaken by several investigators,[2,3] but except for a few limited reports,[4] the value of exfoliative cytology for the detection of oral malignancies has not been explored.

Montgomery and von Haam[5] found that in 13 out of 15 patients, a cytological diagnosis of malignancy could be made from the smears taken from the lesion. The value of the smear as an additional check on the diagnosis was noted by Pomeranz and Stahl,[6] who reported that in four out of eight suspicious smears from oral lesions that eventually proved to be malignant, the first biopsy was insufficient for diagnosis.

The present study was undertaken to determine if malignant oral lesions could be detected from examination of smears and how well these findings would correlate with subsequent biopsies.

*Chief, dental service, Veterans Administration Hospital.

†Assistant professor of periodontia and oral medicine, New York University College of Dentistry, and attending periodontist, Veterans Administration Hospital.

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■ *Method*

Smears were taken of regions of leukoplakia, ulceration or questionable lesions of the oral mucous membranes that had been detected on routine oral examination. Smears were also taken of any ulcerated, slow healing, hypertrophied or other suspect regions from patients who were being followed subsequent to treatment for oral malignancies. Whenever warranted by clinical appearance and history, biopsy specimens were taken shortly after the smear.

The region was wiped with gauze, scraped gently with the edge of a wooden tongue blade, and the scrapings spread on a marked slide in a thin film. The slide was plunged immediately into a solution of ethyl alcohol (95 per cent) and ether, equal parts, fixed for 30 minutes or so, and stained as recommended by

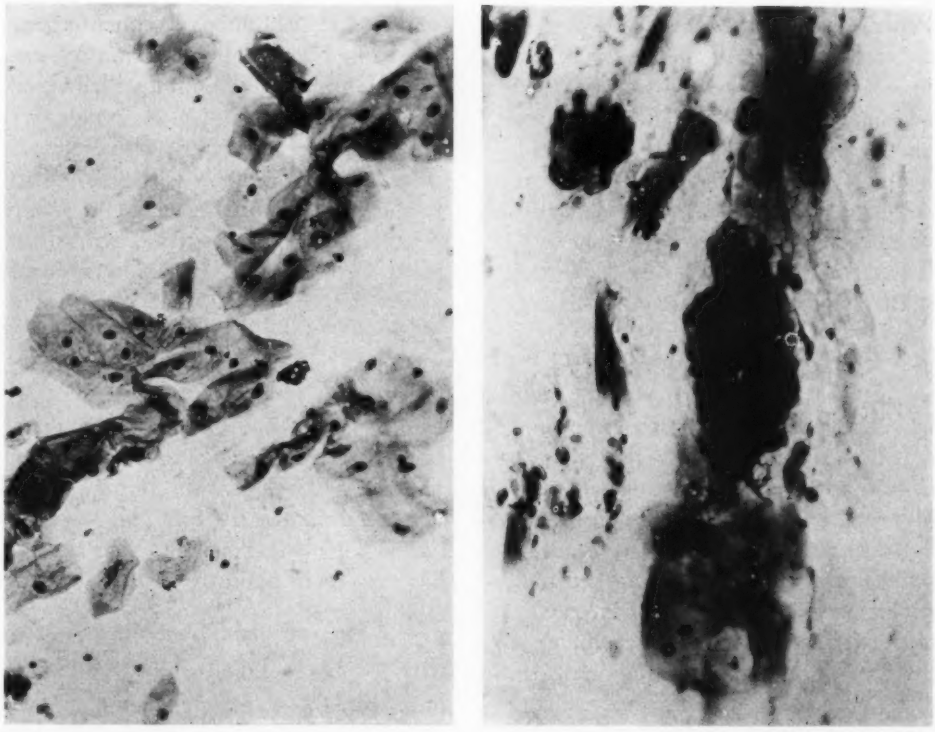

Fig. 1—Left: Photomicrograph of smear taken from hypertrophied circumvallate papilla of tongue showing normal exfoliated epithelial cells. Magnification X150. Right: Photomicrograph of smear from innocuous appearing lesion on mucous membrane of mandibular alveolar process, 1 by 2 cm., slightly reddened, hypertrophied and painless. Palpable submaxillary lymph nodes on same side were also present. Cluster of cells in the center have densely staining, enlarged nuclei with little evidence of cytoplasm. These are strongly suggestive of malignancy. Adjacent is sheet of normal appearing epithelial cells. Subsequent biopsy indicated squamous cell carcinoma. Magnification X150

Table

Relationship between exfoliative cytology and biopsies (Period 8/28/56—12/31/57)

Exfoliative cytology	Biopsy			No biopsy	Total smears
	Carcinoma	Not carcinoma	Total biopsied		
Suspicious of malignancy	34*	0	34	9	43
Normal	4	13	17	91	108
Total	38	13	51	100	151

*Two of these instances were considered normal on the first biopsy but were reported as squamous cell carcinoma on repeat biopsy.

Papanicolaou.[1] Three slides were prepared of each region. All smears were read independently by two individuals (H.C.S. and S.S.S.) in the dental service without knowledge of the results of biopsy. The biopsy specimens usually were taken a day or two later, processed and reported routinely by the pathology section of the hospital several days to a week after the smears had been read and recorded.

■ *Findings*

Smears were taken from 151 patients with oral lesions. In 108 instances biopsy did not seem to be warranted either by clinical appearance or by the smear findings (Fig. 1, left). In nine instances, malignant changes were suspected from the cytological readings but circumstances did not permit biopsy. Two of these patients died, another had anaplastic carcinoma of the lung with metastases, four were still receiving or had just completed radiation therapy, and two refused biopsy at this time (see table).

There were 51 patients, however, for whom both smears and biopsies were available. Smears of oral lesions were read as suspicious of malignancy in 34 instances, and all of these subsequently were proved by biopsy to be squamous cell carcinoma. Epithelial cell forms with atypical characteristics suggestive of malignancy are shown in Figures 1, right, and 2. There were 13 patients with oral lesions productive of normal smears and whose biopsies were also reported as normal. In four patients, the exfoliative cells of lesions were read as normal, but the biopsies of these lesions subsequently indicated squamous cell carcinoma. It is of particular interest that in two of the instances included in the 34 suspicious smears, negative reports were given at the first biopsies. Smears of the lesions in these patients were retaken, and the cells still appeared suspicious of malignancy. The second biopsies proved positive.

■ *Summary and Conclusions*

This preliminary study would seem to indicate that the examination of smears of oral lesions may be sufficiently reliable to warrant use of this technic as an aid in the early detection of oral carcinoma. Of the 51 oral lesions studied, there was agreement between the smear and biopsy findings in 47 instances (92 ± 3.8 per cent).

There were four lesions, the smears of which appeared to be normal but were found to be positive for carcinoma on biopsy.

However, there were also two lesions, the smears of which were suggestive of malignancy but in which negative results were reported on the first biopsy. These subsequently were proved positive after a second biopsy. Occasional false negative findings in histologic specimens, whether the specimen is a smear or a piece of tissue, are inevitable, for samples may be inadequate or may not be representative of the pathologic process.

Biopsy is the diagnostic procedure of choice for the detection of malignant neoplasms, and since oral lesions usually are readily accessible, exfoliative cytology is no substitute for biopsy. However, there are many clinical situations in which biopsies of oral lesions are not feasible, or not acceptable to the patient. The technic is well suited for the follow-up of chronic oral lesions such as leukoplakias, and for the follow-up of patients who have been

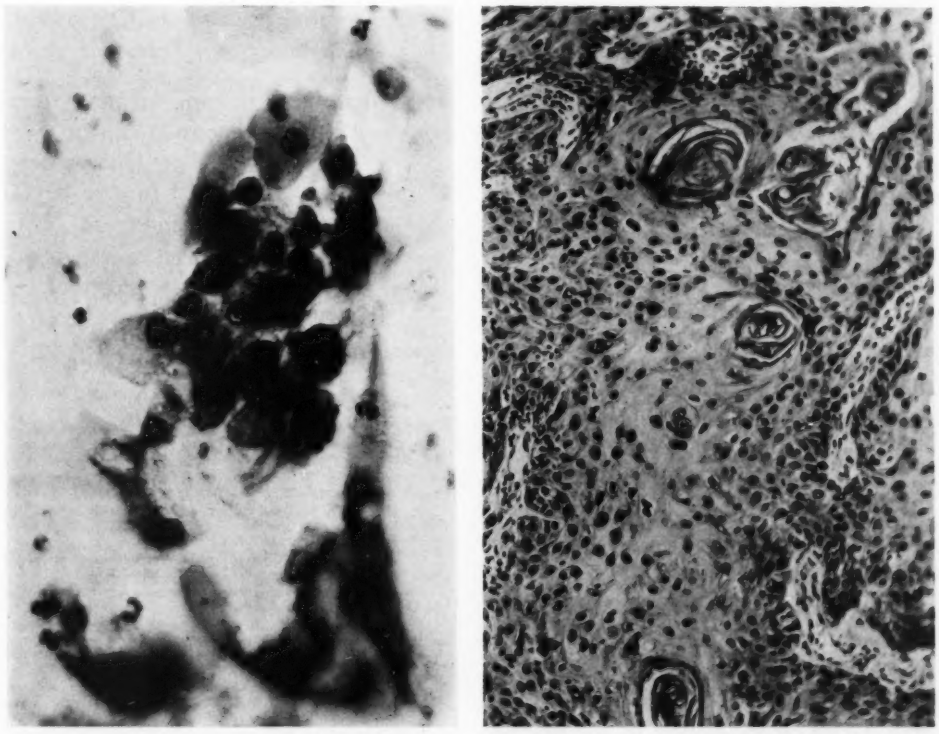

Fig. 2—Left: Photomicrograph of smear from fungating lesion of hard and soft palate clinically typical of carcinoma. Cluster of cells with disproportionately large, deeply staining nuclei, and prominent multiple nucleoli, is suggestive of malignancy. Magnification X250. Right: Histologic section of biopsy from the same lesion. Magnification X120

treated for oral malignancies in whom repeated biopsies are not warranted. Taking a smear of surface cells is so convenient a procedure and the results so reliable, that the investigation and follow-up of comparatively innocuous appearing oral lesions may be encouraged by its wider application.

Methitural sodium (Neraval Sodium), a new ultra-short-acting anesthetic for dental surgery: preliminary report

■ *Herbert A. Krasner, D.D.S., Bloomfield, N. J.*

In a study of 427 ambulatory dental patients, those receiving methitural sodium (Neraval) had a demonstrably shorter recovery time than those receiving thiopental sodium for anesthesia. In the group receiving methitural sodium there was an increase in induction time but a significant decrease in the incidence of postoperative nausea and vomiting.

The introduction of ultra-short-acting intravenous drugs gave tremendous impetus to the use of general anesthesia in oral surgery and more recently in routine dental procedures.[1-3] The route of administration and the properties of these anesthetic agents made them particularly useful for oral surgical purposes.[4] Since their introduction there has been a continuing search for new and safer agents of this type. The present study was concerned with a clinical evaluation of the use in oral surgery of a new agent of the thiobarbiturate group, methitural sodium (Neraval Sodium).

Methitural sodium, a new ultra-short-acting intravenous anesthetic, was first reported in 1954 as Thiogenal by European investigators.[5,6] In over 10,000 instances of induction anesthesia, there were no significant changes in respiration, blood pressure or pulse rate reported.[7-9]

Recovery time, after two minute operative procedures, was reported to be

The Neraval Sodium used in this investigation was furnished through the courtesy of the Schering Corporation, Bloomfield, N. J.

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noticeably shortened, the patients being mentally alert and ready for discharge in from 20 to 30 minutes.[10-16] The drug was well tolerated by patients of all ages.

Methitural sodium is a pale yellow, hygroscopic crystalline material with a strong sulfurous odor. It is freely soluble in water and yields a pH of 9.3 in a 5 per cent solution. The stability of the aqueous solution on standing is similar to that of other sodium thiobarbiturates. Irwin and co-workers[17] found that, in the dog, cat and monkey, methitural sodium possessed approximately two thirds the anesthetic potency of thiopental sodium. Recovery time with equivalent anesthetic doses, however, was more rapid with methitural sodium than with thiopental sodium, and cumulative action was less than that of either thiopental sodium or thiamylal sodium. In a series of tests with dogs, Irwin demonstrated that thiopental sodium showed considerably more toxic effect on the liver than methitural sodium. Blake and Perlman,[18] in their study with dogs and rats, demonstrated that methitural sodium was eliminated more rapidly than thiopental sodium.

Clinical studies in this country in which a full range of operative procedures were used, including major abdominal, plastic and resective surgery and minor surgery on ambulatory outpatients, have confirmed the laboratory observations. Ayd,[19] using methitural sodium for light anesthesia in electroconvulsive therapy, stated that recovery time with this drug was ". . . not significantly different from that with no barbiturate." He further stated that patients not only recovered quickly from methitural sodium but also they did not experience any hangover effect. Houde, Hudon and Jacques[20] used methitural sodium in 112 patients, aged between 2 and 82 years, for long and short surgical procedures. They found that, although the quantity of methitural sodium required to produce hypnosis was greater than that with thiopental sodium, that ". . . repeated administration should not be feared because the cumulative effects of Neraval are less pronounced than with other thiobarbiturates."

An important observation made by Houde and co-workers, and by other recent investigators,[17] was that respiratory depression was less than with the other thiobarbiturates.

Fitzpatrick[21] employed methitural sodium successfully in a series of 85 deliveries without significant respiratory depression of the newborn. Grant-Whyte[22] and others[23, 24] found methitural sodium of particular advantage in brief surgical procedures because it allowed rapid awakening even after large doses.

■ *Method*

Methitural sodium was administered to 344 unselected ambulatory oral surgical

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Table • Comparison of total recovery time after thiopental sodium and methitural sodium anesthesia

Thiopental sodium (83 patients)						Methitural sodium (344 patients)					
Recovery period (range in minutes)	No. of patients	% of patients	Dosage (range in cc. 2.5% sol.)	Duration of anesthesia (range in minutes)	Duration of surgery (range in minutes)	Recovery period (range in minutes)	No. of patients	% of patients	Dosage (range in cc. 4% sol.)	Duration of anesthesia (range in minutes)	Duration of surgery (range in minutes)
0–15	—	—	—	—	—	0–15	2	0.6	8–10	2–3	>1
16–30	1	1.2	12	3	>1	16–30	34	9.9	12–27	3½–27	>1–24
31–45	7	8.4	8–22	4–9	1–6	31–45	73	21.2	6–30	1½–22	>1–19
46–60	17	20.5	6–18	3–7	>1–4	46–60	97	28.1	7–39	2–53	>1–50
61–75	18	21.7	10–20	2½–18	>1–15	61–75	55	16.0	11–38	3½–165	>1–162
76–90	15	18.1	9–27	2½–66	>1–63	76–90	30	8.7	7–35	1–49	>1–46
91–105	12	14.5	9–22	2½–11	>1–8	91–105	19	5.5	10–45	4–48	1–45
106–120	4	4.8	12–27	7–12	4–9	106–120	10	2.9	8–43	3½–42	>1–39
121–135	5	6.0	13–22	5–8	2–5	121–135	12	3.5	8–26	2½–42	>1–39
136–150	1	1.2	18	8	5	136–150	7	2.1	13–28	3½–37	>1–34
151–165	1	1.2	16	6	3	151–165	2	0.6	54–65	32–88	29–85
166–180	—	—	—	—	—	166–180	—	—	—	—	—
181–195	1	1.2	12	5	2	181–195	1	0.3	13	5	2
196–210	—	—	—	—	—	196–210	1	0.3	19	18	15
211–225	1	1.2	47	27	24	211–225	—	—	—	—	—
226–240	—	—	—	—	—	226–240	1	0.3	21	52	49
		100%						100%			

patients ranging in age from 9 to 80 years. A 4 per cent solution was used throughout. For purposes of comparison, a 2.5 per cent solution of thiopental sodium was administered in the same manner to a group of 83 unselected ambulatory dental patients ranging in age from 12 to 68 years. All patients had been requested to fast before reporting.

A brief screening history on past and present medical conditions with particular emphasis on any allergic reactions to anesthetics or premedication was taken. All acceptable patients were premedicated with a combination of 50 mg. of meperidine and 1/100 grain of atropine. Thirty to 90 minutes were allowed to elapse for the premedication to take full effect. During this period, roentgenograms were taken and surgical preparations carried out.

The usual technic for the intermittent administration of intravenous anesthetics was employed. As soon as the unconscious state was reached, as judged by the loss of the lid reflex, supplementary anesthesia with nitrous oxide-oxygen (50:50 per cent or 75:25 per cent) was administered.

Supplementary injections of methitural sodium were made intermittently as needed. On completion of surgery, the lungs of the patients were flooded with oxygen. Throat packs were removed, and excess secretions of blood and saliva were

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23. Boone, J. D.; Munoz, R., and Dillon, J. B. Neraval sodium: a new ultra-short acting thiobarbiturate: preliminary clinical investigations. Anesthesiology 17:284 March 1956.

24. Mersch, M. A.; Clarie, D'A., and Fitzpatrick, L. J. Methitural in general surgery and in obstetrical anesthesia. J. M. Soc. New Jersey 53:414 Aug. 1956.

aspirated until the patient became conscious.

When the patients reached consciousness, they were assisted into a recovery room and allowed to remain there until recovery was complete. Black coffee as a stimulant was offered to all.

The usual setup for the handling of all emergencies was available at all times.

In order to make the study a comparable one, the technic that had been employed previously with ultra-short-acting barbiturates was utilized.

■ *Results*

Methitural sodium was found to be noticeably shorter-acting than thiopental sodium in a series of 427 ambulatory dental patients.

The table shows the total recovery time when methitural sodium was used as compared with that when thiopental sodium was used. Of the 344 patients receiving methitural sodium, 59.8 per cent left the office within one hour after the anesthesia was terminated. Of the 83 patients who received thiopental sodium, only 30.1 per cent left the office within one hour. Of the patients who had been given methitural sodium, 49.3 per cent recovered completely in 30 to 60 minutes, whereas only 28.9 per cent of the patients who had been given thiopental sodium recovered in this same time. Also, 69.9 per cent of the group who received thiopental sodium required over one hour for total recovery, whereas only 40.2 per cent of the group who received methitural sodium required this amount of time.

The incidence of postanesthetic headache, dizziness, nausea and vomiting was significantly less with methitural sodium than with thiopental sodium. A considerable amount of dimenhydrinate was used postoperatively for the patients who had been given thiopental sodium. The prolonged narcosis frequently experienced after thiopental sodium was not noted with methitural sodium.

Induction time with methitural sodium was slightly longer than with thiopental sodium; however, the rapid total recovery was a far greater advantage than this minimal disadvantage. There was occasional brief coughing or transient hiccups during induction, but this could be virtually eliminated by slowing down the rate of injection.

■ *Summary*

1. A new ultra-short-acting intravenous anesthetic, methitural sodium, administered to 344 ambulatory dental patients was found to be noticeably shorter acting than was thiopental sodium which was administered to 83 ambulatory dental patients.

2. Of the 344 patients who received methitural sodium, 59.8 per cent left the office within one hour after the anesthesia was terminated, whereas only 30.1 per cent of the group who received thiopental sodium were able to do so.

3. The incidence of postanesthetic headache, dizziness, nausea and vomiting was significantly less when methitural sodium was used. The prolonged narcosis frequently experienced with thiopental sodium was not noticed with methitural sodium.

4. Induction time with methitural sodium was increased slightly over that of thiopental sodium. — 364 *Franklin Street.*

Selection of anesthesia

■ *Harold W. Krogh, D.D.S., Washington, D. C.*

Much has been said and written about selection of drugs and methods for anesthesia. The subject has been given a complex analysis by most writers, but careful study of the reports seems to indicate that this aspect of anesthesia generally has been overemphasized. In hospitals as in dental offices, differences in anesthesia selection between the theoretically ideal and the personal predilections of the anesthetist or surgeon may be settled in favor of the latter consideration. This decision is seldom detrimental to the patient because good scientific basis does not exist for assuming that there is only one truly satisfactory drug or method for any given situation. But as knowledge and skills increase, the ideal will be approached more often. This is surely the aim of all who administer anesthetics.

In this paper the attempt will be made to justify dealing with the subject from the viewpoint of the realities encountered in everyday practice where especially for routine cases little real scientific consideration is applied to the selection of anesthetic drugs, where the stronger arguments for selection, though rarely presented or even admitted, seem to be related to personal preferences of the patient, the referring dentist or physician, and the oral surgeon.

Secondly, certain physical conditions will be reviewed which demand from the anesthetist something more than a rigid routine in relation to anesthesia with an outline of the principles upon which such nonroutine approaches should be based.

Even in hospital practice, mortality statistics are patchy, incomplete and conflicting, whereas in dental practice they are virtually unavailable. However, all statistical studies indicate that failures in management of the anesthesia course and of resuscitation, and not faulty anesthetic selection, are the real killers and producers of complications.

Since scientific factors are generally nonoperative in anesthetic selection it is well to face frankly the other things which may influence one's choice. And in the study of selection it should be borne in mind that skill of administration often is a more significant factor than drug selection and, furthermore, that good over-all management may far outweigh both, especially as regards uncomplicated recovery.

The specialty of oral surgery was undoubtedly built on the use of general anesthesia in office practice. In fact, the public in most regions of the country associates this method of anesthesia with specialists in the removal of teeth. This is the first of several countering influences to true scientific selection.

It is difficult and time-consuming to

Presented before the Section on Anesthesiology, ninety-eighth annual session, American Dental Association, Miami, Fla., Nov. 4, 1957.

learn the technic of general anesthesia and to train the surgical team and auxiliary personnel in the routines necessary for its successful use. Dental schools with one or two exceptions have never figured prominently in general anesthesia teaching and perhaps it is not a proper subject for them. Now that hospital anesthesia departments have taken over the broad general anesthesia training of dentists, it is imperative that men so taught return to dental practice or teaching rather than go into hospital anesthesia practice. Otherwise this fine effort on the part of the profession's medical colleagues to raise the standards of general anesthesia practice in dentistry, and particularly in oral surgery, may be discontinued. Also, it must be recognized that even after adequate training in the hospitals, the dentists so trained may need help in making the transition from general operating room anesthesia to the specialized needs of general anesthesia for oral surgery in office practice.

Until the last few years, when certain physician anesthesiologists generously opened their hospital departments for the training of dentists, the majority of oral surgeons worked for a time in the offices of other oral surgeons or found other ways to become proficient in the use of one general anesthetic drug. Having successfully developed an over-all technic using a particular drug, there is a natural tendency to become satisfied with it, to minimize its shortcomings and even eventually to oppose the use of newer drugs. Consequently, once a routine is established and working, an enormous effort is needed to adopt additional or newer methods and drugs.

Indeed there is much to be said in favor of stereotypy in oral surgery, where anesthesia and surgical team technic can be stereotyped to a degree not possible in other branches of surgery; but stereotypy must not be allowed to prevent change completely.

How then do dentists progress to better and safer methods and drugs? Certainly it would be undesirable and unsafe to abandon proved methods and to try everything that comes along, and yet the search for better and safer pain control must continue and the results eventually must be reflected in practice. Specifically, oral surgeons should be taught how and encouraged to use anesthetic drugs which do not interfere with adequate respiration or those which permit, if needed, the simultaneous administration of oxygen in amounts above the physiological minimum.

■ *Reasons for Selection*

Those who have made the mental and technical adjustments coincident to changing from a long established community-accepted anesthesia routine to one unfamiliar to the surgical team and community alike realize that it is a step not to be undertaken lightly.

Almost everyone will agree that the drug or method best understood and practiced in a particular office is the safest one for the patients in that office, so that selection often becomes mere rationalization for the use of the method currently employed. Thus there are offices in which procaine is used, those in which gas is used, and those where intravenous administration is used. To paraphrase the words of Henry Ford, who said that cus-

tomers could have a car of any color they wanted so long as it was black, patients can have any anesthetic drug they wish so long as it is the drug used in that office.

The fact is that a large number of patients select the office or oral surgeon because that office or surgeon is associated with the use of a certain method or drug.

Patients have a right to express a preference for an anesthetic drug, but having done so are usually willing to take the oral surgeon's advice. Those who unwillingly accede may end up dissatisfied or even resentful. For that reason, if after explanation one of my patients is reluctant to accept my choice and if there is no contraindication to the method requested, I am inclined to give him his way. There is one exception: I might use local anesthesia when I think general anesthesia would be better for the patient, but I would not use general anesthesia when I was convinced that it was unwise to do so in the office. Oral surgeons have an obligation to their patients and to their specialty not to take unnecessary risks and thus possibly bring criticism on the office use of general anesthesia. Dentistry has a tremendous stake in general anesthesia and nothing should be done which might endanger the historical and legal right to use it in individual offices.

Not infrequently a patient arrives with instructions for or against the use of a certain method or drug received from his family, referring dentist, or personal physician.

The family instructions usually reflect the family experience and attitudes or those gained through conversation with neighbors, friends and others, with an occasional reaction to recent newspaper or magazine articles. If these instructions seem unwise to the oral surgeon they usually can be changed by a short explanation to either patient or parent as to why another method is preferable for a particular operation.

All oral surgeons are acquainted with the vagaries of the general practitioner's reasons for referring patients and their occasional reluctance to allow the oral surgeon a free hand in anesthesia selection. It is illogical but true that dentists who would resent any suggestions or instructions regarding their phase of dentistry think it quite proper for them to advise patients and oral surgeons regarding the anesthetic drug to be used, although this advice is seldom, if ever, based on personal competence in the administration of general anesthetics.

Physicians, like dentists, have their own notions regarding anesthetic drugs, conditioned almost always by the routines followed during their intern or resident days. Like the experts on the radio who can, by hearing a word inflection, locate the area where the speaker grew up, so one frequently can identify the attitude of physicians and dentists toward dental anesthesia with the geographical area of their training or even to particular hospitals or men in charge. Medical students and interns receive very little, if any, more instruction than dental students in the administration of general anesthetics, but patients are inclined to endow physicians with knowledge and judgment superior to that of dentists.

Although it is well known and generally agreed that the oral surgeon must accept the ultimate responsibility for the patient's safety and welfare, it is never-

theless true that noncompliance with the referring dentist's instructions may have untoward economic results whereas noncompliance with those of physicians, particularly in patients who are bad risks, may even have dento-legal overtones.

The large majority of referred patients come uninstructed or their instructions or desires coincide with the selection of the oral surgeon. Such a fortunate situation makes it easier for all concerned and leads to excellent public and professional relations, a fact which should receive serious consideration by all those who refer patients.

Continuous daily physician-advised or self medication has reached alarming levels in our population. Since many of the commonly used drugs are depressants and ganglionic blocking agents and therefore hypotensives, or have other properties which might influence the patient's anesthetic or surgical management, preoperative conversation should be concerned with eliciting information regarding such usage.

The physical status of each patient should be evaluated, chiefly in terms of oxygen reserve, which is low even under the best of circumstances. This information should be equated with the pharmacological properties of the anesthetic drugs available in that particular office. Questions concerning the physical condition of a patient should be directed toward determining the degree of limitation, if any, of physical activity, the best index of oxygen reserve. Much more useful information will be gained and less apprehension produced by asking about the patient's daily activities than by asking if he has heart trouble, and so forth, or by filling out a detailed history sheet. Here another exception should be noted; if there is a suggestion that the patient may have had rheumatic fever, the specific question should be asked, and if answered in the affirmative, he should receive antibiotic or chemotherapeutic protection and the anesthesia managed in accordance with the impaired circulatory system.

As a rule, a woman with children who regularly does her own housework, or a man who goes to work every day can withstand a short, properly given general anesthetic.

■ *Premedication*

Since anesthesia may properly be said to begin with premedication, it is important to consider premedication carefully in its relation to the over-all problem of anesthesia and emergence from it. Too often premedication has become a matter of routine rather than of adaptation to the individual patient. Such routine use results in unnecessary, inadequate or overmedication on many occasions. Premedication should be used only when there are specific indications and with dosage adjusted to the individual's requirements. Some valid indications are overexcitement of certain types or the desirability for depression of parasympathetic phenomena, chiefly for the drying effect.

It should be remembered that central nervous system depressants also are respiratory and metabolic depressants and are much longer acting than the anesthetic drugs commonly used in dentistry so that emergence from anesthesia will be prolonged after their use. The sympa-

thetic and parasympathetic systems are normally in balance; depression of one system removes the balancing effect and allows the other to assume relative predominance. Thus parasympathetic depression is followed by sympathetic overaction, which in turn increases oxygen demand. Therefore, if an anesthetic is given without an accompanying central nervous system depressant, the patient will require a greater amount of anesthetic drug than with such medication.

In office practice, depression of the central nervous system to an anesthetic level is accomplished most conveniently, quickly and safely using the intravenous thiobarbiturates. Atropine, the usual parasympathetic depressant, even when administered intravenously, requires five minutes to produce its full effects and thus is of no value in short procedures. The author prefers to manage secretions without atropine; however, some operators find its drying effect helpful during long operations.

Because of the inherent toughness of human beings, the anesthesia predilections of patients, family, friends, referring dentists, physicians and oral surgeons usually can be followed without jeopardizing the safety of patients. But there remain a small number, perhaps 2 or 3 per cent, whose physical status demands the most careful consideration. These are the patients who have serious limitations in their oxygenation mechanisms, either of the respiratory or circulatory systems, and those who have qualitative disorders of metabolism, such as diabetes, uremia, adrenocortical deficiency syndromes, and so forth. The problems of the aged and infirm tend to concentrate in this group because the percentage of bad risks is higher here than anywhere else.

A few general thoughts can be kept profitably in mind during the administration of anesthesia for these patients. Limitations in the oxygenation mechanism constitute a relative threat to life by lowering the oxygen reserve and making it difficult to make up a temporary oxygen deficit, such as may occur during anesthesia. Although the hazards may be somewhat more remote for patients with metabolic disturbances, mismanagement of anesthesia is equally dangerous.

The kind of anesthesia selected and over-all management should not aggravate, if possible, the underlying physical deficiencies. By making a wise selection of drugs or methods, exercising great care, administering minimum dosage and maximum oxygen, and using sound judgment as to operation time, the necessary surgery may be completed.

The anesthetic selected should be one which permits the continuous, concomitant flow of oxygen and precludes an excitement stage. Unless the nasal inhaler causes undue apprehension, oxygen administration should be started first. All patients, of course, are expected to have constant, careful attention. It is physically and mentally impossible for anyone to give undivided attention to every second of every procedure during the day. However, patients who are bad risks should receive it. One of the marks of competence and professional ability is to single out those patients who should be so treated.

Perhaps minimum dosage is the most important factor in management of the "risk" patients. They require surpris-

ingly small amounts of anesthetic drugs; dosage may be as small as one tenth of the amounts commonly used. They react sluggishly, however, so that it is easy to think the calculated dose was insufficient and to give more than is needed. It should not be forgotten that emergence and detoxification of the anesthetic drug will be slow also. Finally, operations should be kept short; seconds are important. Here is where a well trained anesthesia-surgery team pays off.

Only a relatively few patients have qualitative disorders of metabolism, but any patient may have quantitative differences in metabolic rates at the time of operation. Such quantitative differences depend on the individual's basal metabolic rate plus the superimposed effects of nervous stimulation, chiefly emotional in character. It seems to be the common lot of patients to be apprehensive before dental surgery, thus many patients have increased metabolic rates. Of course, some patients have very stable nervous systems which are unaffected by the prospect of dental surgery. Because of the wide variations in preoperative metabolic rates in addition to the other factors which influence the course of anesthesia such as age, state of health, pain and fever, selection, induction dosage, maintenance and emergence must be individually determined. There can be no satisfactory answer, therefore, to the question "how many cc. do you give?" or "what dial settings do you use?" There is nothing mechanical in the consideration of anesthesia although mechanics is employed to achieve it.

In general it may be said that conditions which raise or lower or leave unchanged the normal metabolic rate affect the starting point of anesthesia and the amount of depressants needed for induction and maintenance as well as the postanesthetic behavior. Those patients with severely raised metabolic rates sometimes may benefit from preoperative central nervous depressants. Vasoconstrictors should be avoided because they may whip up an already overworking heart. Also to be avoided are anesthetic drugs which have an excitement stage because that stage increases an already high oxygen requirement. More potent drugs should be employed to overcome the high anesthesia starting point and more than average amounts of anesthetic drugs will be required although emergence and detoxification will be quicker than average. Oxygen in higher than 20 per cent concentration may be needed to satisfy oxygen demand during maintenance. On the other hand those with low metabolic rates should not receive central nervous system depressants preoperatively. Less potent drugs may be employed and less than average amounts will be needed. Detoxification will be slow. Therefore, drugs which require metabolic breakdown should be used sparingly. Oxygen may still be desirable because of sluggish transport by the circulation.

■ *Anesthesia Problems*

At the risk of overemphasizing the difficulties posed by a small percentage of patients, it is appropriate to make examples of several well known problems in management.

The most difficult patients to manage successfully in the dental office in relation to euphoria and recovery are

those with low blood pressure who are excessively nervous. The starting point of anesthesia in this condition is high and a disproportionate amount of depression is needed to obtain surgical anesthesia. For these patients I find it advantageous to use an inhalant in conjunction with an intravenous drug in order to reduce the amount of drug which the patient must metabolize. A new intravenous drug, methitural sodium (Neraval), seems to contribute to quicker recovery.

Patients with high blood pressure should be protected against painful stimuli since such stimuli have a pressor effect. An increased oxygen percentage intake is also a wise precaution as well as the avoidance of those anesthetic drugs known to increase blood pressure.

Prolonged disorientation characterizes the recovery period of children when a thiobarbiturate alone is used. When nitrous oxide-oxygen alone is used, the recovery period is frequently marked by crying. Reimer developed a method which overcomes this double disadvantage. A nitrous oxide-oxygen induction is started with the machine set to deliver 10 per cent oxygen. Just before the excitement stage is reached, the venipuncture is made and a small dose of methitural sodium (60 to 120 mg.) or thiopental sodium (40 to 80 mg.) is given. Light surgical anesthesia is immediately established without excitement. The oxygen setting is increased to 20 per cent or more for the maintenance period. Surgical anesthesia may be maintained for long periods by additional minute injections of a thiobarbiturate, provided that adequate ventilation is not prevented by obstruction or central depression. The total dosage of the thiobarbiturate is usually less than one half that which an induction by a thiobarbiturate alone would require. This technic is followed by a fast, calm recovery, which is a great improvement over the recovery period of either agent alone. The nitrous oxide induction is not objectionable to most children and the venipuncture is not remembered. However, children, too, have heard of the intravenous method and some may ask for the needle first. In that event, a nonsleep-producing dose which will not appreciably depress respiration may be given and the nosepiece then placed with the machine set to deliver 20 per cent of oxygen with the nitrous oxide.

Diabetics on insulin therapy are advised to take their usual morning dose and to satisfy their breakfast food requirement with orange juice. Two hours later the necessary surgery is done under intravenous anesthesia. Hemostasis should be assured before allowing the patient to leave the office so that bleeding will not interfere with the next meal.

Pregnant women react well to light, intravenous anesthesia. Administration of oxygen is begun before injection of the intravenous drug and continued throughout the operation.

Balanced anesthesia, or polypharmacy, is not of itself a safer method than depending upon a single drug. It is necessary to know the minute-to-minute action of all drugs being used. In all combined anesthesia approaches where more than one drug effect is employed, it is essential for best results that maximal effects be concentrated during the brief period of surgery. For example, in combining gas with intravenous drugs the gas administration

must be started long enough before the drug injection so that nitrogen displacement may be appreciable before adding a drug which will achieve significant effect in the few seconds required by circulation time.

There is as yet no direct drug antagonist to the barbiturates although diligent search is being made to find one. Those substances which are said to counteract barbiturate overdosage or speed up barbiturate detoxification produce their effects by stimulating the central nervous system and perhaps indirectly increasing metabolic rate and not by direct action against the barbiturate. Some of these drugs are shorter acting than the barbiturates so that the awakening may be of short duration, the patients again relapsing into deep sleep. Others are longer acting than the barbiturates and if used to awaken patients quickly who have had a small total dose of barbiturate, produce prolonged mental stimulation which interferes with normal sleep. Finally, it is well to remember that all analeptics are central nervous system stimulants and thus increase oxygen demand in the brain. Accordingly, they should not be used in the presence of an oxygen deficit which cannot be corrected readily.

If contraindications do not prevent the choice of either of two anesthetic routines, it is logical and proper to select the one with the greatest patient appeal. This is the significance and the justification for the "practice building" shift to intravenous technics as has occurred in so many places. Anesthesia not only should facilitate surgery but wherever possible make it pleasant. It is now known how to achieve such an anesthesia in practically all instances.—*1835 Eye Street, N.W.*

■ Scientists and Laymen

What scientists do, it seems to me, is to find out what is going on—either inside us, or outside us, or both. Scientists, then, are definitely set to eradicate mystery. Yet nonscientists, including some members of the popular press, tend to believe that there is something mysterious about science; that in consequence it is appropriate to regard scientists with awe, to praise them unmercifully, to laugh at them, to be afraid of them, or to consult them on questions that are not always framed in clear and answerable terms.

Nonscientists tend to believe that a scientific institution is swarming with eye-popping discoveries . . . , most of which the scientists conceal because they are overcautious. Laymen cannot bring themselves to believe that science is singularly undramatic; it is difficult to convince them that science is not a continuing series of spectacular advances, on all fronts at once.

Scientists . . . are aware that hundreds of scientists and thousands of engineers worked for a significant fraction of a century on the problem of nuclear fission. They feel that laymen must learn not to expect the same sort of spectacular success every week, . . . must learn that the progress of science is a slow creep, consisting of thousands of small successes; must learn that only now and then is a result achieved that is both dramatic and obviously meaningful to the multitude.—*M. W. Thistle, Popularizing Science. Science April 25, 1958.*

Prevention and control of staphylococcus infections in hospitals:[1] bulletin 1

The following bulletin was prepared by the Council on Professional Practice's Committee on Infections Within Hospitals of the American Hospital Association. It was approved by the Board of Trustees of that organization, and was sent to all hospitals listed by the American Hospital Association.

Because of the increasing problem of staphylococcal infections in hospitals and the consequent need to call the recommendations in the bulletin to the attention of all persons in the health field, the JOURNAL OF ORAL SURGERY is glad to make this information available to the dental profession.

■ *Knowledge of Current Situation*

1. It is clear that throughout the world, in spite of the enormous success of antibiotics (and, as will be mentioned below, to some extent because of this success) there remains an important problem of infections, a problem of special significance for hospitals. This report is concerned with such infections, particularly those caused by the coagulase-producing strains of *Staphylococcus aureus hemolyticus*. The most obvious examples are impetigo and more severe infections in children, puerperal mastitis in recently delivered women, burn and postoperative wound infections, and pneumonia in debilitated patients. The staphylococcus may also be responsible for osteomyelitis, meningitis, septicemias, empyemas, boils and abscesses, otitis media, paronychiae, etc.

Disease-producing staphylococci frequently implant in the nasopharynx without overt disease, thus producing carriers. Indeed, the staphylococcus carrier-rate is a good index of the level of contamination of the environment.

2. Many hospitals have a serious problem with staphylococcus infections, and all hospitals have a potential problem. Information is inadequate as to the incidence of staphylococcus infections which are acquired in hospitals, but there is evidence that the number of such infections is increasing.

3. There appear to be innumerable strains of staphylococcus capable of producing infections. Many of these staphylococci are susceptible to antibiotics. Some are not. Infections with antibiotic-re-

This bulletin was prepared by the Council on Professional Practice's Committee on Infections Within Hospitals consisting of Dean A. Clark, M.D., chairman; William A. Altemeier, M.D.; C. P. Cardwell, Jr.; James P. Dixon, Jr., M.D.; Maxwell Finland, M.D.; Horace L. Hodes, M.D.; Martha Johnson, R.N.; and Alexander D. Langmuir, M.D., in consultation with Kenneth B. Babcock, M.D., of the Joint Commission on Accreditation of Hospitals; William H. Stewart, M.D., of the Public Health Service, and others.

1. The Committee on Infections Within Hospitals is charged with the responsibility of recommending American Hospital Association policies and programs on the prevention and control of all infections within hospitals. Because of the general interest in the problem, this bulletin is devoted to the staphylococcus. Two earlier bulletins on Asian influenza have been distributed.

sistant staphylococci constitute the main difficulty. Hospitals are clearly the reservoir of most antibiotic-resistant strains. Strains from the community at large are predominantly sensitive to antibiotics. The strains carried by patients on admission are less frequently resistant than strains which are acquired in hospitals. Patients who acquire these infections in the hospital are potential spreaders of resistant strains to the community after discharge. One of the major factors in the current situation is the widespread use of antibiotics which eliminates susceptible strains of staphylococcus and leaves uncontrolled the resistant strains.[2]

4. Certain factors frequently found in hospitalization appear to make patients more likely to acquire such staphylococcus infections: a) routine indiscriminate use of antibiotics, especially for "prophylaxis"; b) long hospital stay; c) contact, direct and indirect, with infected hospital patients, staff members or personnel; d) crowding and inadequacy of facilities; e) prolonged operative procedures; f) prolonged use of continuous parenteral therapy through venipunctures or indwelling plastic tubing.

5. Certain factors in the host (patient) appear to increase susceptibility to infection: a) treatment with adrenocortical steroids; b) physical debility; c) chronic disease; d) prematurity; e) diabetes; f) bed sores; g) open wounds or breaks in the skin; h) chronic pulmonary disease.

6. Danger of infection seems to be especially great from direct exposure to people infected with the staphylococcus, although exposure to the same organisms in or on contaminated equipment, supplies, dressings, air, dust, wall or floor surfaces, linens, etc., may be equally as important. The physician, nurse or other attendant with a boil, paronychia, abscess, or nasopharyngeal infection with a virulent strain is particularly hazardous.

■ *Recommendations*

I. All hospitals should establish Committees on Infections, to devote particular attention to infections which are acquired in hospitals so they may be reduced to the lowest possible minimum.[3]

A. It is suggested that the Committee on Infections include, where possible, a bacteriologist, a pediatrician, a surgeon, an internist, a nurse, and a hospital administrator. The local health officer should be urged to serve as a consultant to the committee. The committee should report periodically to the executive committee of the medical staff.

B. The functions of the Committee on Infections should include at least the following:

1. To establish a system of reporting infections among patients and personnel, such a system being essential to a proper understanding of infections which are acquired in hospitals. The committee should have access to all reports of infections anywhere in the hospital.

2. It is not known whether resistant strains of this organism actually acquire resistance after exposure to the antibiotics, or are resistant to begin with and are simply unmasked by the suppression of susceptible strains—although the latter is thought to be the case. From a practical point of view, it does not matter which theory is correct.

3. The Joint Commission on Accreditation of Hospitals is being asked to consider the establishment of a Committee on Infections as a major factor in the accreditation of a hospital. Bulletin 17 of the Joint Commission contains recommendations on the subject.

2. To keep records of infections as a basis for the study of their sources and for recommendations regarding remedial measures.
3. To distinguish to the best of its ability between infections acquired in the hospital and those acquired outside.
4. To review the hospital's bacteriological services to make sure that such services are of high quality and are accessible either in the hospital itself or in an outside laboratory. Bacteriophage typing, if not available in the hospital, may be sought, as needed, through official local and state health agencies.
5. To review aseptic techniques employed in operating rooms, delivery rooms, nurseries, and in the treatment of all patients with infections and, if indicated, to recommend methods to improve these techniques and their enforcement.
6. To make vigorous efforts to reduce to the minimum consistent with adequate patient care:
   a) Use of antibotics, especially as "prophylaxis" in clean, elective surgery
   b) Treatment with adrenocortical steroids
7. To undertake an educational program to convince medical staff and hospital employees of the importance of reporting to responsible authorities when they have skin infections, boils, acute upper respiratory infections, and the like.
8. To establish techniques for discovering infections which do not become manifest until after discharge from the hospital, it being known that such infections are often overlooked because they may not be apparent until several weeks after the patient has left the hospital. Two approaches to discovering such infections are suggested:
   a) An attempt to trace the source of any infection with which a patient may be admitted. For example, if an infant is admitted with staphylococcal pneumonia or a recently delivered mother with mastitis, the hospital where delivery occurred should be determined and informed of the infection so that it can seek possible sources of infection.
   b) Periodic telephone polls on a random sample of discharged patients (particularly recently delivered mothers, newborns, and postoperative patients) to ascertain their state of health and, in case of any indication of infection, to follow them up. Such surveys have proved quite simple and quite valuable. A detailed account of the method is given by Ravenholt and others in the October 1956 issue of the American Journal of Public Health.

II. Hospital administration should undertake the following measures to assist in the control of infections:

A. Diligent maintenance of the general cleanliness of *all* areas in the hospital, not simply in those associated with operating rooms, delivery rooms, and nurseries. Other possible sources, such as dust, air pollution (special attention should be given to ventilating and air-conditioning systems and their filters), and floors must also be considered as potentially important factors

in the spread of infection. There should be regular inspections of the hospital for general cleanliness.

B. Special studies among staff and personnel to uncover silent carriers of staphylococcus, especially in epidemic situations accompanied by repeated cases traceable to the same organism.

C. Appropriate measures for the treatment of all carriers who persistently show heavy growth of epidemic strains of staphylococcus in nasopharyngeal cultures or who are identified by epidemiological evidence.

D. Transfer of such carriers and personnel with skin infections, boils, acute upper respiratory infections, and the like from locations such as operating rooms, delivery rooms, food-handling positions, and nurseries to other duty stations in the hospital. Usually such transfers have proved to be sufficient to control the problem, but occasionally leave of absence for a persistent carrier has been necessary.

III. Hospitals should initiate or participate in community programs to control infection through cooperation with other hospitals, local medical societies, local health departments, and other groups.

■ *General Comment*

1. Occasionally, an entire hospital, a whole community, or a large area seems to become subject to an epidemic strain of staphylococcus. Why this occurs is not known. Its occurrence, however, points up the need for more general recognition and study of staphylococcus infections.

2. Among the agencies from which consultation and assistance concerning infection problems may be sought are the following:

(a) The American Hospital Association, the American College of Surgeons, and the American Academy of Pediatrics (especially for newborn infants) which will furnish upon request the names of suitable consultants.

(b) Local and state health departments which, in many instances, have experts on their staffs.

(c) The Communicable Disease Center of the U. S. Public Health Service, Atlanta, Georgia, whose assistance may be obtained through local and state health departments.

3. Valuable background information and discussion about the infection problem can be found in:

(a) Conference on staphylococcal infections. (Symposium) Journal of the American Medical Association. 166: 1177-1203, March 8, 1958; (Editorial p. 1205)

(b) Observations relative to the nature and control of epidemic staphylococcal disease. F. H. Wentworth and others. American Journal of Public Health. 48:287-98, March 1958

(c) New York (State) Department of Health Guide for the prevention and control of infections in hospitals. Albany; 56 p. illust. 1957

(d) New York Academy of Science. Staphylococcal infections: a symposium. The New York Academy, 1956. 57-246 p. illust., tables. (Annals of the New York Academy of Sciences, 65: 57-246)

(e) The problem of postoperative wound infection and its significance. W. A. Altemeier. Annals of Surgery, 147:770 1958.

VOLUME 16 • SEPTEMBER 1958 • NUMBER 5 CASE REPORTS

Calcifying epithelioma of Malherbe: *report of case*

■ *Irwin A. Small, D.D.S., Detroit*

The tumor designated as calcifying epithelioma of Malherbe is found primarily in children and young adults and most commonly in the region of the head. It was described first by Malherbe and Chenantais[1] in 1880. This rare lesion occurs as a solitary, small, hard nodule beneath an intact skin. The nodule is freely movable with the skin but may be adherent to the underlying tissue.

In one report there were 59 females and 26 males.[2] In three large institutions there was an incidence of about 1 in 2,000 surgical specimens.[3] In two of the largest series reported, 23 appeared before the age of 20 years, 12 appeared between the ages of 21 and 50 years, and 11 appeared after the age of 50.[3, 4]

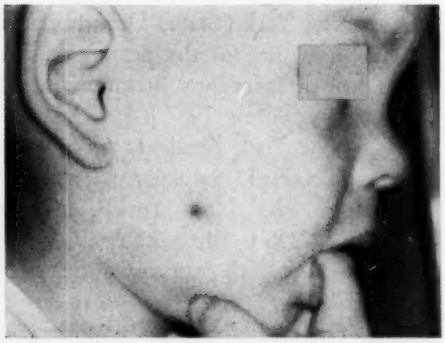


Fig. 1—Two year old boy with pea-sized nodule in right cheek

REPORT OF CASE—The patient was admitted to Mt. Carmel Mercy Hospital because of intermittent bleeding from a nodule in the right cheek.

HISTORY—A 2 year old white boy had been noted to have a red, pea-sized lesion in the right cheek six months before admission. During the last month it had grown in size and become more discolored (Fig. 1). There had been a few episodes of spotty bleeding for three months.

The medical history was essentially negative.

PHYSICAL EXAMINATION—The patient was a well-developed, well-nourished white boy with a small, dark-colored nodule in the right cheek. The mass was slightly elevated, bluish-purple and fixed to the subcutaneous tissue. The lesion was 1 cm. in its greatest diameter and nontender to palpation. There was evidence of a small cutaneous sinus tract. The remainder of the physical examination, a complete blood count and urinalysis were within normal limits.

Formerly, oral surgery resident, Mt. Carmel Mercy Hospital.

1. Malherbe, A., and Chenantais, J. Note sur l'epitheliome calcific des glandes sebacies. Bul. Soc. anat. de Paris 15:169, 1880.

2. Muehlon, W. F. Zur Kenntnis des Malherbe'schen Epithelioms. Schweiz. Zschr. Path. Bakt. 5:53, 1942.

3. Lever, W. F., and Griesemer, R. D. Calcifying epithelioma of Malherbe; report of 15 cases. Arch. Dermat. & Syph. 59:506 May 1949.

4. Ch'in, K. Y. Calcified epithelioma of the skin. Am. J. Path. 9:497 July 1933.

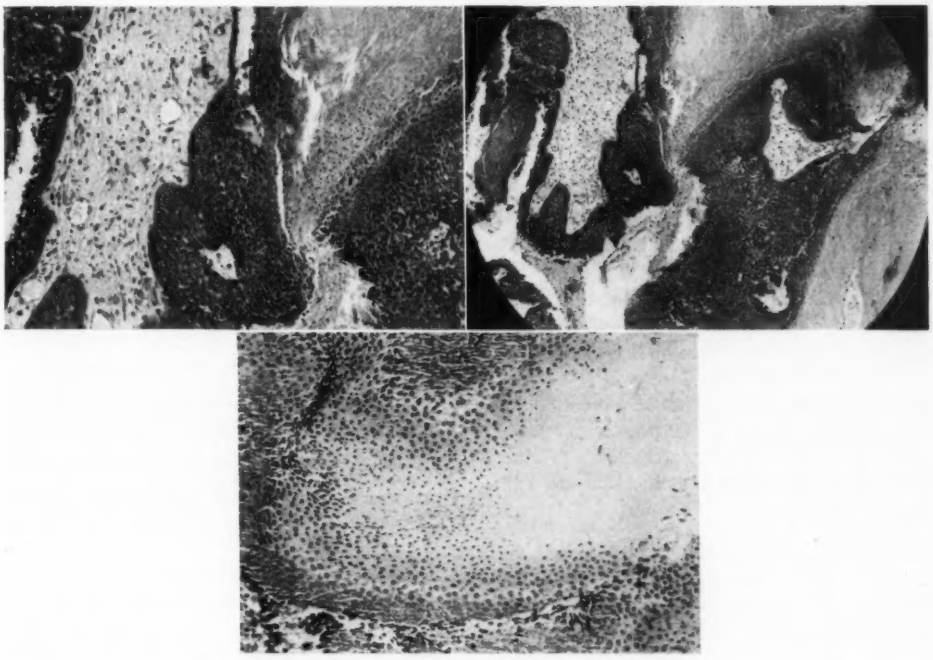


Fig. 2—Above left: Basophilic cells with large nucleus and centrally placed nucleolus and shadow cells. Above right: Sheets of basophilic and shadow cells with scanty, well-vascularized stroma. Below: Transition into keratinized tissue and shadow cells

SURGICAL PROCEDURE—With the patient under ether anesthesia an elliptical incision was made outlining the area of induration. The mass was removed by sharp dissection and submitted for laboratory examination.

Bleeding points were clamped and ligated. The subcutaneous tissues were closed with interrupted no. 0000 chromic gut sutures. The skin was closed with no. 0000 nylon vertical mattress sutures. The incision was treated with benzoin tincture and covered with sterile gauze and adhesive tape. The postanesthetic and postsurgical course was uneventful.

LABORATORY REPORT—The tumor consisted of an encapsulated nodule containing two distinct types of cell masses. One was composed of basophilic cells with large, round nuclei containing a prominent nucleolus. The cytoplasm was scanty. These cells were arranged in bands about the second cell mass which were sheets of keratinized tissue containing shadow cells (Fig. 2, above). This tissue was eosinophilic, and transition was seen between the basophilic cell and the shadow cell (Fig. 2, below). The cellular stroma contained an occasional foreign body giant cell.

The diagnosis was calcifying epithelioma of Malherbe.

DISCUSSION—The calcifying epithelioma of Malherbe is a benign lesion of obscure origin. Many pathologists consider these tumors to be related to calcifying epithelioma of sebaceous glands or as tumors of cell rests derived from sebaceous gland epithelium. Some workers believe that calcified epitheliomas arise from cells of the hair matrix and that the transition of

basophilic cells into shadow cells represents a form of keratinization rather than degeneration.[5] Others are of the opinion that calcifying epithelioma of Malherbe is a tumor derived from the "primary epithelial germ."[6] This neoplasm may originate in hair follicles.[7] King[8] used the term "mummified epidermal cysts" because not all of these tumors are calcified. However, most authors agree that the shadow cells or clear cells represent regions of squamous differentiation.

A distinction must be made between calcifying epithelioma of Malherbe and calcified epidermoid cyst, since they both have in common epithelial cell masses in which shadow cells and keratinized material are present. They may be differentiated by the presence of basophilic cells in the calcifying epithelioma of Malherbe and of squamous cells in calcifying epidermoid cyst.[3]

SUMMARY—A case of a rare skin tumor of the orofacial region has been reported. The diagnosis of calcifying epithelioma of Malherbe can be made only on histopathologic examination. This tumor is differentiated from a basal or squamous cell carcinoma arising in sebaceous or epithelial cysts by the presence of basophilic cells and shadow cells. Encapsulation and its lack of connection with the epithelium distinguish it from ordinary basal or squamous cell carcinoma. These tumors are benign, and should be surgically excised.—*7411 Third St.*

5. Ormsby, O. S., and Montgomery, H. Diseases of the skin, ed. 8. Philadelphia, Lea & Febiger, 1954, p. 791.

6. Lever, W. F. Pathogenesis of benign tumors of cutaneous appendages and of basal cell epithelioma; benign tumors of cutaneous appendages. Arch. Dermat. & Syph. 57:679 April 1948.

7. Puente Duany, N. Calcificados de la piel. Bol. Soc. Cubana de dermat. y sif. 7:45 June 1950.

8. King, L. S. Mummified epidermal cysts (so-called "calcified epitheliomas"). Am. J. Path. 23:29 Jan. 1947.

Calcified hemangioma of the cheek: *report of case*

■ *Richard J. Burch,* D.D.S.; Edward C. Funk,† D.M.D., and Thomas S. Shuttee,‡ D.D.S., Lackland Air Force Base, Texas*

Hemangiomas generally are considered as benign neoplasms of vascular tissue. They can be found throughout the oral cavity, with the cheeks, lips, tongue, floor of the mouth and the buccal mucosa being the common sites of occurrence.[1] They may be congenital or developmental in origin. The developmental form of these lesions is generally precipitated by trauma. They are formed from endothelial rudiments or from the endothelium of blood vessels, which produce buds of endothelial tissue because of the mechanical pressure of the circulation. These endothelial buds proliferate and form new blood vessels with no definite pattern or arrangement.[2] Thrombi often form in the lumen of these blood vessels, organize, and produce scar tissue. In the late stages this

*Colonel, USAF, Dental Corps; chairman, department of oral surgery, 3700th USAF Hospital.

†Major, USAF, Dental Corps; assistant to chairman, department of oral surgery, 3700th USAF Hospital.

‡Major, USAF, Dental Corps, assistant to chairman, department of oral surgery, 3700th USAF Hospital.

1. Bellinger, D. H. Blood and lymph vessel tumors involving the mouth. J. Oral Surg. 2:141 April 1944.

2. Bernier, J. L. A manual for the differential diagnosis of oral lesions. St. Louis, C. V. Mosby Co., 1942, p. 132

scar tissue gives the tumor a firm consistency. Phleboliths also can form from these thrombi in other instances.[3]

REPORT OF CASE—On October 4, 1956, an airman, 23 years of age, was admitted to the oral surgery service of the 3700th USAF Hospital for evaluation and treatment of a mass in his right cheek.

EXAMINATION—The patient was a well developed, well nourished white man of Finnish ancestry who was alert, cooperative and in no distress. Examination of his oral cavity revealed no abnormality of structure or pathologic change. The oral mucosa was normal in color and consistency and the oral hygiene and dentition were excellent. No oral or dental infection was found. Roentgenograms of his skull, face and teeth revealed no pathologic changes.

A 3 by 3 cm. mass that was quite firm and regular in shape could be palpated in the right cheek at the anterior border of the masseter muscle. No pulsation could be felt within the mass and it was not compressible. The patient stated that he had first noticed a small "lump" in his cheek about two years previously. It had slowly enlarged in size but was never painful. He had sought treatment when the mass had reached a size which interfered with his shaving.

The remainder of his physical examination was within normal limits and noncontributory. Results of a routine urinalysis and hematologic and serologic examinations were normal and the chest roentgenogram was negative.

The patient was placed on routine hospital care and supportive treatment during his physical examination and general workup. Clinical evidence and past history of the lesion pointed to a differential diagnosis of either a mixed tumor or a hemangioma. The patient was registered and presented to the tumor board, and it was the board's unanimous recommendation that surgical removal of the mass was the treatment of choice.

OPERATION—Under nitrous oxide-oxygen-ether anesthesia administered through a nasotracheal tube, the patient was prepared and draped to expose the right cheek and submaxillary region. An 8 cm. incision was made through the skin and superficial fascia of the right side of the face beginning just below and parallel to the inferior border of the mandible. The platysma muscle was divided by sharp dissection and retracted. The masseter muscle was exposed and the tumor mass located at its anterior border. Minimal bleeding was encountered, and no definite capillary bed was observed to be in the vicinity of the mass. The mass was not encapsulated and was dissected from the anterior half of the masseter muscle without difficulty. Hemostasis was easily effected, and the wound was closed in layers using no. 000 plain gut to close muscle and subcutaneous tissues, and the skin incision was closed with a continuous no. 00000 silk suture.

A collodian tape dressing was applied over the incision, and a pressure bandage was used to help control postoperative edema. The patient withstood the procedure well and was returned to the recovery ward in good condition.

His postoperative course was uneventful. On November 8 he was discharged to duty.

The pathological diagnosis was thrombosed angioma of venous origin, with calcification.

COMMENT—Although hemangiomas of the deep structures of the face are not seen frequently they should be considered in the differential diagnosis of masses in and around the oral cavity.

Solitary circumscribed tumor masses of vascular tissue occur more frequently along the anterolateral border of the masseter muscle than has been generally recognized.

Positive diagnosis of all tumor masses of this type should be by histopathologic examination.

The treatment of choice is surgical excision, when the mass is confined to an accessible anatomic region.

3. Thoma, K. H. Oral pathology, edition 4. St. Louis, C. V. Mosby Co., 1954, p. 1403.

VOLUME 16 • SEPTEMBER 1958 • NUMBER 5

Commercial insurance coverage of dental claims

RECENT DEVELOPMENTS indicate that commercial insurance companies are changing their views regarding the payment of claims for surgical operations covered by their policies and performed by dentists.

Prior to 1955, the efforts of representatives of the American Dental Association to call the attention of individual insurance companies to this problem were notably nonproductive. In that year, the several trade associations serving the insurance companies which write various forms of health insurance combined to form the Health Insurance Association of America. This organization now represents some 250 companies which write approximately 80 per cent of the health insurance provided by insurance companies.

Shortly after the Health Insurance Association of America was formed, representatives of the Council on Dental Health of the American Dental Association conferred with representatives of the Health Insurance Association of America regarding the application of the insurance principle to dental care. It was agreed that a close liaison between the two associations was highly desirable. It was agreed also that the first problem for consideration should be the payment of claims for those acute medical and surgical procedures involving the oral tissues which are normally performed by the dentist.

Effective liaison has been developed through meetings between staff representatives of the Health Insurance Association of America and the American Dental Association and through reciprocal participation in national conferences sponsored by each organization. These conferences have brought out the fact that the insurance industry's former failure to recognize the validity of dental claims and to include them in policies was caused by lack of information. These conferences enabled the dental profession to acquaint the insurance industry with the relationship of dental health to general health and to call attention to the fact that the profession and the industry are mutually concerned with problems of total health.

One of the specific benefits resulting from liaison between the American Dental Association and the Health Insurance Association of America was the issuance by the Continental Casualty Company January 1, 1958, of a dental rider to all its hospital-type policies and the issuance of an identical rider by Continental's sister company, Transportation Insurance Company. As experience develops, the action taken by Continental is expected to be duplicated by other national companies and by state and regional companies.

As stated by the House of Delegates of the American Dental Association[1] last November 1, the Association's role in attaining coverage of insurable dental risks in health insurance contracts is one of education of, and cooperation with, the insurance industry. In order for insurance companies to increase their service to the public and improve their competitive position, they undoubtedly will expand their coverage to include those dental procedures which have the same medical and surgical characteristics as those provided for in their general coverage. At the present time the two associations are exploring the possibility of establishing a satisfactory method of payment within the insurance mechanism for dental services other than oral surgery. The Association will continue to cooperate with the insurance industry to see that the indicated expansion is brought about. Such cooperation is in the interest of the public, the profession and the industry.

1. American Dental Association. Transactions 1957. Chicago, American Dental Association, 1957, p. 390.

■ In the past several years many articles have appeared in the literature in which the use of antihistamines, enzymes, and so forth, was advocated for the control of postoperative edema. In an effort to find a panacea for this annoying and complicating operative sequelae, one time-honored aid has often been overlooked. Adequately-placed pressure dressings have been used as a sound surgical adjunct for many years, and no satisfactory substitute has been found.

Admittedly, the placing of a pressure dressing about the face is not always practical and never esthetic. However, when it is used for the control of edema after the difficult and time-consuming removal of an impaction, a pressure dressing can be most effective. A single 4 by 4 inch sponge should be placed on the face adjacent to the operative site, followed by the application of an elastic bandage wrapped securely over the area. Slippage of the dressing can be controlled with adhesive tape. Left in place for 24 hours, the dressing makes postoperative edema and bleeding almost nonexistent. Some stasis may be present anteriorly, but this disappears rapidly when the dressing is removed.

This procedure is not suggested for the average impaction as generally it is not necessary but should be reserved for those operations which, in the opinion of the surgeon, result almost certainly in postoperative edema.

■ The spotlight of attention on safe roentgenographic procedures has illuminated several points on which there can be little disagreement. Chief among these is that the professions are clearly obligated to use technics which will entail the least possible exposure consistent with required diagnostic information.

In general, it is desirable to use the highest kilovoltage which will produce films with adequate contrast. Up to 90 kvp is often practical. However, there is a noticeable lessening of contrast when such high kilovoltages are applied in roentgenography of thinner, less dense structures, as in children.

Most dentists are accustomed to using a set kilovoltage of about 60 kvp, controlling the intensity of radiation and film density by varying the milliampere seconds of exposure to different dental regions; excellent roentgenographic results can be achieved with fast films by such means.

With the new machines, 90 kvp is sometimes used for all exposures, but this often results in overpenetration and reduced contrast of the less dense areas, even with decreased exposure. Therefore, for most satisfactory results with the higher-voltage equipment, a flexible technic based on variable exposure factors is advisable.

■ Recently an enzyme, penicillinase, was introduced for the specific purpose of combatting allergic reactions to penicillin. It catalyzes the hydrolysis of penicillin to penicilloic acid which is nonallergenic. Whereas the antihistamines and steroids treat the effects of an allergic response to penicillin, this specific enzyme counteracts the cause of the reaction by neutralizing the penicillin itself.

The drug is administered intramuscularly as soon as signs and symptoms of a reaction appear. It may be repeated daily if needed and should be given intravenously in the presence of an anaphylactic reaction to penicillin.

Readers are invited to send their clinical observations to S. Elmer Bear, Department of Oral Surgery, Medical College of Virginia, Richmond, Va.

■ Youth Best Time for Third Molar Removal

Q.—What is the most favorable age at which impacted or malpositioned mandibular third molar teeth should be removed?

A.—A study of all age groups of the population representing various pathologic conditions in the mandibular third molar region reveals to the practitioner the importance of roentgenographic examination of the region at a relatively early age. Pathologic conditions range from simple pericoronitis to deep impactions with cystic involvement and bone loss. Through early roentgenographic examination, reasons for prophylactic removal of the malposed or impacted third molars become sound and logical.

After the removal of these impactions, clinical observation indicates less postoperative morbidity in the younger patients; that is, those in their late teens or their twenties. The explanation no doubt lies in the fact that the blood supply is more copious to bone in the young. Better blood supply means a higher incidence of healing by first intention. Healing by second intention is not only accompanied by greater morbidity but by depressions of the alveolar ridge from scarring. This is of special importance around the distal margins of the second molars where the loss of ridge height may mean reduction in periodontal attachment with resultant tooth sensitivity and possible loss of additional teeth. It should be kept in mind that early removal of these teeth offers the following advantages: (1) the teeth will be easier to remove from more pliable bone; (2) the root length may be less, and (3) the relationship of the tooth to the contents of the inferior dental canal may be more advantageous.

The orthodontist sometimes feels that the third molars may be contributing to occlusal problems. It may seem advisable to remove these teeth at an even earlier age than mentioned previously. Two problems arise from these considerations: (1) there may be additional growth of the mandible to allow for further eruption of the tooth, and (2) the treatment of patients at an earlier age presents several problems in operation. Teeth in their rounded crypts of development are difficult to remove and patients at this age are not too receptive to operative procedures of this type. High speed engines may facilitate the sectioning of the incompletely developed third molar.

■ Causes of Trismus

Q.—What is the treatment for the patient who exhibits trismus, but shows no evidence of obvious oral infection?

A.—The most common causative factor of trismus of the mandible is pericoronal involvement adjacent to the third molars. Having eliminated this as the cause by careful clinical examination, one must then take a careful and detailed history. Traumatic injuries to the facial components must be considered. A pathologic condition of the temporomandibular joints may produce trismus but the diagnosis usually can be made by digital pressure on the joints or by roentgenograms.

Frequently the history reveals that the patient has had some recent dental care including a mandibular injection. This may have occurred up to six weeks prior to the trismus. An examination of the medial aspects of the ramus

This section devoted to queries and comments from readers on topics of current interest to oral surgeons and general dental practitioners is edited by S. Elmer Bear, Department of Oral Surgery, Medical College of Virginia, Richmond, Va., to whom readers are invited to send their communications. The answers, prepared by competent consultants, do not necessarily represent the opinions of any official scientific organization. Your participation in this section is invited.

The Editor.

usually will give some evidence of low grade infection. The patient generally will have some mild tenderness in the region of the internal pterygoid muscle. In order to examine the region, it may be necessary to open the mouth forcibly. This procedure is accompanied by pain, and intravenous medication may be desirable. The trismus results from a contraction of the internal pterygoid muscle in response to a low grade needle tract infection or an infected hematoma resulting from the injection.

Treatment consists primarily of antibiotics and manipulation of the mandible. It may be necessary to use a prop at regular intervals to eliminate the trismus. Should a fluctuant region ever be noted it should be drained promptly. Recovery generally is slow and is in direct ratio to the patient's ability to tolerate pain when the prop is used. The use of one of the powerful muscle relaxants at the time of manipulation, might be considered although it should be administered in small doses because of its respiratory effect.

■ Extractions During Pregnancy

Q.—Should extractions be done during pregnancy?

A.—In recent years there has been a feeling among medical men that painful and infected teeth need more than tempering treatment during pregnancy. It is felt that the deleterious effects of leaving these teeth in the mouth may be greater than any that may arise from their judicious removal.

The second trimester of pregnancy seems to offer the most favorable period. During pregnancy, it is recognized that the general resistance of the body is at a high level. Further, when trouble does arise, the body defenses seem to be at an unusually high level. Surgical wounds respond well during this period and clinical observation shows that extraction sites heal with rapidity and minimal morbidity.

Necessary extractions to relieve pain and eliminate infections should be done when indicated. They should be handled by those able to render the service under the most favorable conditions and with the least amount of trauma. The physician in charge of the general care of these patients should also be consulted.

■ Supernumerary Teeth

Q.—I have a patient in her mid-forties who has a group of small supernumerary teeth located between the mandibular bicuspids. Should they be removed and how is this classified?

A.—Using the single roentgenogram which accompanied this question as the only criterion for diagnosis, one would classify it as a composite or compound odontoma. This is the type of odontoma which contains two or more rudimentary teeth which are fairly well formed and have some resemblance to the anatomic arrangement of dental structures.

In the treatment of this lesion, the dentist must be acutely aware of the relationship of the odontoma to the bicuspids. If the patient is completely free of symptoms and if additional roentgenograms show the lesion to lie almost directly between the roots of bicuspids, surgical intervention probably should be avoided. Occlusal films and careful digital examination may be of considerable value in determining the exact location of the lesion. The taking of roentgenograms periodically to evaluate subsequent cystic degeneration is imperative and should there be any change, the odontoma should be removed promptly in an effort to preserve the bicuspids.

■ HISTOLOGY. By Arthur Worth Ham, M.B. Third edition. 894 pages with 582 illustrations, including eight color plates. Index. $11. Philadelphia, J. B. Lippincott Co., 1957.

A reviewer accepts a revised text with a certain amount of skepticism as to how much revision has occurred in the new edition. This is a book wherein every chapter has been altered, in most instances through expansion of content. Certain sections have been rewritten with little content expansion, while a few parts have either been condensed or eliminated.

The author is to be congratulated on his style of writing. He has assembled a scientific book so as to make the reading of its contents one of ease. His opening chapters are undoubtedly designed to create within the student a desire to know and to like histology. The use of simple illustrations of methods of approach to this study lessens the complexity of the subject.

The most extensive changes are to be found in the chapter on the cell. It is a splendid discussion of the topic with fine comparisons between the findings of the light microscope and the findings of the electron microscope.

In the field of research, the electron microscope has been instrumental in bringing forth new findings, and these findings have been incorporated within their respective fields. In all instances where this type of material has been added, it has been augmented with excellent electron micrographs.

The subdivision "Fine Structure" has found a place in several chapters to bring more specifically minute details to the reader.

Histochemistry is discussed in various chapters along with the endocrines and the influence they exert in tissue characteristics.

Other significant contributions pertain to transplantation of tissues, blood clotting, and calcification of cartilage. The entire section on teeth has been revised.

Each chapter closes with an extensive bibliography, greatly expanded over previous editions.

The book is beautifully illustrated with 64 new illustrations, bringing the total to 582. Eight of these are color plates. Many of the new illustrations are electron micrographs, some of which are a full page. There are a few drawings and some artists' conceptions of tissues and parts of organs.

In closing, let us say "It is a job well done."—*J. Robert Schumaker.*

■ MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX. Edited by Edwin P. Jordan, M.D. Seventh edition. 1,516 pages. Indexes. $17.50. New York, Drug Publications, Inc., 1958.

This reference work is revised every few years. It contains descriptions of many trademarked drugs and of a few which are not designated by brand names. The information is supplied by the distributors of the drugs. Each purchaser of the book automatically receives a small supplement called *Modern Drugs* every two months. The supplement contains descriptions of new drugs.

Each description includes the commercial source, the generic name, the chemical nature, actions and uses, dosage, available dosage forms, precautions, and sizes of trade packages. The narcotic drugs are designated by the code letters A, B and X, to indicate that they are (A) under full control, (B) may be prescribed orally or (X) are exempt. Prescription drugs are indicated by the code designation "Ps."

The emphasis on brand names detracts slightly from the otherwise clear and dignified presentation of reliable information. This will perhaps be unavoidable as long as the editor depends on the distributors of the listed drugs for the descriptions. The generic name index is near the so-called "General Index," but is

hard to find. The "General Index" lists some generic names, but the cross-indexing is inadequate. Many drugs more important to dentists than to physicians, and some very widely used medical preparations, are not listed. Physically, the book is of high quality. It is competently edited.

Modern Drug Encyclopedia is most useful for two purposes. It provides a quick means of finding the generic name and commercial source for old and new drugs when one knows only the trademark name. It also furnishes therapeutic information about many drugs which are still too new to be described in textbooks.—*Donald A. Wallace.*

■ THE VOCABULARY OF DENTISTRY AND ORAL SCIENCE. By George B. Denton. 207 pages. Index. $4. Chicago, Bureau of Library and Indexing Service, American Dental Association, 1958.

The first few pages of this book supply an excellent account of what prompted its writing, the purpose of it, and an outline of the plan adopted to achieve its end.

In a two-page foreword, Donald Washburn, director, Bureau of Library and Indexing Service, gives the background needed for an intelligent comprehension of Dr. Denton's book. This is followed by six pages in which the author explains the purpose and plan of his work.

The book "is intended as a manual of instruction on the terminology of the health professions and sciences, especially dentistry." Unlike ancient Gaul, which had three parts, this book has four. The first of these, "Foundations of Scientific Language," in 75 pages, is the longest. Obviously it should be, for undoubtedly it is here that those for whom the book is intended will need most instruction and guidance. It is safe to assume that dentists are in the same boat with the rest of us when it comes to ignorance about such subjects as "Characteristics of Scientific Language," "Principles of Choice and Coinage of Terms," and "Dictionaries and Other Language Aids." What Dr. Denton says in this part has pertinence for all of us interested in terminology.

The next part deals with "Special Nomenclature Problems of the Dental Branches." Most of it is taken up with a discussion of the nomenclature problems of operative dentistry, prosthodontics, oral surgery, and orthodontics. Concise information is supplied about each of these departments of dentistry, and their names explained.

Part 3, "Procedures for the Solution of Dental Nomenclature Problems," is the one in which Dr. Denton's long training and sound judgment shows to excellent advantage in such chapters as those on "How to Write a Useful Definition," "How to Choose the Preferable Term," "When and How to Coin an Acceptable Term."

In the last part of the book the author deals with "Selected Dental Vocabulary with Critical Notes." The term selected for instructive comment here are extremely interesting, even to a mere layman having no particular acquaintance with the terminology in this field. For example, the author says of hypnodontics that it was introduced about 1950, and encountered criticism "on the grounds that it implies an effect upon the teeth and not on the whole personality . . . It is a procedure only, and is better represented by the term 'hypnosis in dentistry'."

Dr. Denton is certainly not among those unfortunates who require maximum wordage to impart minimum content—or, sometimes, no content at all. The book exhibits throughout a fine appreciation of the value of words, and the wickedness of wasting time. No one can read its crisp, clear pages without feeling that here is the work of a mature scholar of sound judgment.

The book is a must for all students and practitioners of dentistry.—*M. M. Mathews.*

■ HEREDITARY ECTODERMAL DYSPLASIA OF THE ANHIDROTIC TYPE. Ralph Bowen, M.D. South. M. J. 50:1018 Aug. 1957.

The literature includes nearly 100 reports of hereditary ectodermal dysplasia of the anhidrotic type. These include four negro children. Of the entire group all are males except for four girls. Occasionally it occurs more than once in a family, and in one family there were seven instances over four generations and transmission was through the female.

Because of the unusual facies, characterized by high wide brows, these persons all show a remarkable degree of resemblance. The nasal bridge is usually depressed and the lips tend to be thick. Cardinal high lights of the condition are summarized as follows: (1) heat intolerance due to generalized absence of sweat glands; (2) partial to complete absence of both deciduous and permanent teeth with deformity of those which are present; (3) a decreased number of hair follicles and sebaceous glands as shown by a dry, smooth, shining skin. Some have papillary lesions on the face (degenerating sebaceous glands with surrounding acanthosis), and absent or sparse fine dry hair.

Other disturbances which are found more or less commonly are: atrophic rhinitis; myopia; chronic pharyngitis and laryngitis; absence of taste and smell; deformed ears such as satyr-shaped, or absent lobules; conjunctivitis; absence of tears; plantar or palmar keratosis; apparent saddling of the nose; possible absence of mammary glands; everted lips with poor definition of the vermilion border; thickened cranial bones but with the skeleton otherwise normal; and possibly mild mental retardation.

True anhidrotic ectodermal dysplasia must be differentiated from hidrotic ectodermal dysplasia, Werner's syndrome, Rothmund's syndrome, and the Hutchinson-Gilford type of progeria.

Two instances of this condition are reported. Since these children have an elevated temperature daily, the recognition of the condition is important to avoid abuse or unnecessary use of antibiotics. Progressive dental prostheses are required.—*William J. Amaral.*

■ SOME ASPECTS OF FRACTURES OF THE HORIZONTAL RAMUS OF THE MANDIBLE IN CHILDREN. P. H. D. Lewars, B.D.S., M.B. Brit.J. Plast.Surg. 10:218 Oct. 1957.

Fractures in the horizontal ramus in 21 patients in a 4 to 11 year age group were reviewed with the purpose of studying late effects of fracture on developing dentition in children. Evaluation was based on special features observed in children; their diagnosis; effects of fracture on the developing teeth and dental occlusion, and ob servations on the treatment.

Compared with the commoner fractures seen in adults involving one or two teeth, fracture lines in the children involved from 2 to 14 teeth and a correspondingly greater proportion of the bone. This feature is not always fully revealed by clinical and roentgenographic examination. Fractures in children involving unerupted teeth need not always be considered compound fractures, because in early developmental stages they are deeply situated in bone. The effect of such teeth on the healing of a fracture is not clear, but their presence or absence does not hasten or retard union. Some fractures in children unite more rapidly than those in adults, possibly because a relatively greater area of bony contact is likely to exist.

In diagnosis of a facial fracture, the history, roentgenograms, and inspection of face and mouth often provide more information than palpation which may distress children. Dental occlusion is of variable importance in incomplete or mixed dentitions and may be unreliable or misleading. Intraoral roentgenograms, with rare exceptions of occlusal views, are of limited value, whereas the posteroanterior, 30 degree lateral, and submentovertical views usually ade-

quately demonstrate fractures of the horizontal ramus.

Injury to a tooth crypt does not necessarily cause serious injury to the contained tooth, and a substantial number of injured developing teeth in a fracture line may be expected to grow into useful members if retained. Teeth in crypts suffering maximum displacement are most severely affected; abnormalities observed include growth arrest of the tooth or part of the tooth; premature closure of the apical foramens; restricted formation of roots, resulting in a slender apical portion being formed subsequently; narrowing of the pulp chamber; radiopaque deposits in the pulp, and delayed eruption.

Developing teeth at a distance from the fracture line may suffer somewhat similar effects attributable to local or systemic causes.

Malocclusion may follow fracture of the horizontal ramus as a result of loss of teeth or malunion. This series failed to demonstrate that deformity after fracture can be masked by modeling resorption. Bone loss was not made good during subsequent growth; and where it had occurred, permanent shortening of the horizontal ramus was the result. These sequelae of malunion make anatomical reduction imperative in all instances.

The importance of each tooth in the developing dental arches is such that serious irregularity results from loss of one or more teeth and their removal should be avoided where possible. The author believes the risk of infection after replantation of dislocated teeth is negligible if suitable antibiotic therapy is maintained for seven days after injury and "dead space" between bone fragments is minimized by anatomical reduction. Erupted teeth which have been replanted should be immobilized throughout the period of fracture immobilization which, as in adults, is about 32 days. Unerupted developing teeth should be retained and may be replanted in a fracture line if dislocated from normal position, apparently without delaying union. Unaffected erupted teeth may be required to stabilize splints, but where it is necessary to lessen strain on only a few such teeth, circumferential wires may be placed over extensions of the splint that cover edentulous regions.

The simplest method of reduction should be employed, but accuracy of reduction should not be sacrificed for simplicity. Open reduction with direct wiring may be used and its indications are as follows: where the occlusal pattern is difficult to determine owing to loss of teeth in mixed dentition and malocclusion; multiple fractures where anatomical reduction of one facilitates stabilization of other fractures; where foreign bodies, which may be developing teeth, lie in the fracture line, and where anatomical reduction is otherwise impossible. Care is required in the operation because the mandible in children has a broad lower border in the tooth-bearing region, cortical bone is thin and dental crypts, particularly in the cuspid regions, come close to the surface. Interosseous wires must be placed in cortical bone and not subjected to undue strain. Overlay splints with circumferential wiring as used in edentulous patients may supplement the transosseous wiring.

Finally, the patient should be re-examined at regular intervals after treatment until dentition is complete to determine if late effects of fracture require orthodontic intervention.—*William J. Amaral.*

■ REPLANTATION OF THE MANDIBLE IN CANCER SURGERY. Robert L. Harding, M.D. Plast. & Reconstr. Surg. 19:373 May 1957.

The purpose of this paper is two-fold; first to call attention to an anatomic splint readily available in certain procedures where part of the mandible has been sacrificed, and second, to add further evidence that heat-treated bone acts as a nonvital foreign body, at least when used to restore lost continuity of the mandible after cancer surgery. It is an accepted fact that patients with cancer of the mouth necessitating resection of part of the mandible, will have a more comfortable and a safer postoperative course if the retained segments of the mandible are stabilized and the pharyngeal funnel is not permitted to collapse.

In selected instances of cancer of the mouth, it is possible to obtain an anatomic splint at the operating table which will fit the defect accurately and give adequate mechanical

support. This is obtained by salvaging the resected segment of the mandible from the gross specimen, curetting out the diseased bone, autoclaving the remaining portion to destroy any cancer cells, and then utilizing it as an anatomic splint to maintain postoperative stability of the lower jaw and pharyngeal funnel. This nonvital anatomic splint is replanted in its normal position and held with direct or Kirschner wires. The evidence seems to indicate that the autoclaved bone acts as a tolerated foreign body and is gradually resorbed. It has exhibited no evidence of osteogenetic potency. There has been no "creeping substitution" nor evidence of osteoblastic or osteoclastic ability. There has been no evidence of osteogenetic activity on the extraskeletal connective tissue.—*Herbert J. Bloom.*

■ Subdural Hematoma: Analytical Study of 123 Cases. Jose Humberto Mateos, M.D., and Richard Daly, M.D. South. M.J. 51:94 Jan. 1958.

Analysis of the signs and symptoms of subdural hematoma based on the study of a series of 123 patients treated from 1945 to 1955 and verified at surgery or autopsy, is presented. Advanced age is associated with the increased frequency of this disturbance. The decrease of elasticity of the dural veins and their adherence to the calvarium predisposes these vessels to rupture. Moreover, members of this accident-prone age group naturally suffer more head trauma. A predominance of males in the series supports the general impression that subdural hematomas are more common in the male and the disproportion seemingly is accounted for by occupations and social habits.

A history of trauma may or may not be elicited, although 90 patients in this series had a history of head trauma. Loss of consciousness and a lucid interval are two phenomena which merit special attention, and this series revealed that 86 patients suffered loss of consciousness; of these, 72 had a lucid interval, which was found to last from a few hours to several years, but was most commonly four to six weeks in duration.

This analysis and survey of the literature point to certain signs and symptoms as particularly trustworthy in evaluation of instances of possible subdural hematoma, but no single sign or symptom has been found pathognomonic of the disease. The most common and most valuable symptom was headache; 59 patients in this series had this complaint. Frequently, dizziness in association with mental confusion is one of the first symptoms to appear; dizziness was present in 39 per cent of the patients of this series. Nausea and vomiting were present in 24 per cent; these symptoms were seen most frequently in association with increased intracranial pressure. A change in personality manifested by bizarre behavior, mental confusion, or impairment of memory is frequently the first indication of subdural hematoma; therefore, the danger of overlooking this condition in a confused individual cannot be overemphasized. Along with mental disturbances 51 patients had urinary incontinence. The possibility of subdural hematoma in a confused and incontinent person should always be considered. Only 25 patients of the series had convulsions; in these instances, a suppression of activity over the involved region is the important diagnostic feature on the electroencephalogram.

Hypertension was found in 33 per cent of these patients, which figure may reflect the influence of the age distribution, but the rise in blood pressure with increased intracranial pressure is a common phenomenon. Only seven patients had a bradycardia, and 24 had a pulse rate above 100. It has been emphasized, however, that a slow pulse is typical of chronic subdural hematoma. Of the 123 patients, 38 showed some degree of hyperthermia. This observation is difficult to evaluate since dehydration and infection are common in the stuporous or comatose patient. In some instances hyperthermia was difficult to control, pointing to central origin.

Pupillary abnormalities can help an early diagnosis. In this series there was homolateral dilatation in 26 per cent, contralateral dilatation in 12 per cent and bilateral dilatation in 9 per cent. Occurrence of bilaterally dilated pupils insensitive to light signifies a poor prognosis. The incidence of papilledema has varied in

different series; in this series it was present in 15 patients.

Seventy-five patients of the series showed disturbances in motility varying from monoplegia to a picture of decerebrate rigidity. The fact that almost the same frequency of contralateral and homolateral hemiplegias were present demonstrated the false localizing nature of these signs. In general, sensory disturbances were thought to be unreliable aids to diagnosis in view of the frequent disturbance in the level of consciousness. As a diagnostic feature of subdural hematoma, the Babinski reflex showed obvious limitations in this series.

The valuable information which may be obtained by lumbar puncture seems to overshadow its hazards. Special roentgenographic studies are indicated whenever the diagnosis is in doubt and there is no definite contraindication to these procedures. Despite its potential dangers, arteriography is the most useful device for demonstrating subdural hematoma.

Subdural hematoma is treated by drainage of liquid blood and removal of clots and membranes. Bilateral trephination is the simplest and least traumatic of the procedures used. Subdural hematoma is a surgical emergency and the mortality rate is alarmingly high. Death is certain in untreated patients.—*William J. Amaral.*

■ ROENTGEN DIAGNOSIS OF SEX BASED ON ADULT SKULL CHARACTERISTICS: COMPARISON STUDY OF CEPHALOMETRY OF MALE AND FEMALE SKULL FILMS (FRONTAL PROJECTION). Jorge L. Ceballos, M.D., and E. H. Rentschler, M.D. Radiology 70:55 Jan. 1958.

One hundred normal adult male and 100 normal adult female skull films obtained under standardized conditions with the mouth in closed position were evaluated in an effort to establish characteristic dimensions for the sexes. Comparison was made with regard to the following characteristics noted on the frontal projection (posteroanterior):

1. Sagittal diameter: Measurement of the distance from the top of the skull in the midline to the lower edge of the mandible.

2. Mastoid length: Measurement of the distance from the inferior tip of the mastoid process to the petrous ridge perpendicularly above the mastoid tip.

3. Mandible width: Measurement of the distance from one lateral border of the mandible to the other similar border at the level of the mastoid tip.

4. Mandible angle width: Measurement of the width of the mandible at the angle, this being the distance from the outer to the inner margins.

Results of measurements of the afore-mentioned listed diameters were tabulated and in the center of each table there was an area of overlapping or a "neutral zone" in which the measurements were similar for the sexes. On the basis of findings in the two groups and careful analysis of the "neutral zone" which included 13 "failures," characteristic dimensions for the male and female were established which permit prediction of sex with 88 per cent accuracy. Included are five tables and six figures. —*William J. Amaral.*

■ A NEW LOOK AT THE ETIOLOGY OF CLEFT PALATE BASED ON A STUDY OF 164 FAMILY HISTORIES. Eleanor J. Stiegler and Mildred F. Berry. Plast. & Reconstr. Surg. 21:52 Jan. 1958.

A study of the family histories of 164 children entered for speech therapy in the Cleft Palate Center at Rockford College, Rockford, Ill., led to the following conclusions:

1. The belief of other investigators is supported that the chief etiologic basis of cleft palate and other structural malformations resides in genic transmission. Cleft palate and other structural malformations may be caused by a common "malformation gene."

2. The high incidence of speech defects noted in the families of children with cleft palate lends support to the theory of genic transmission of neural or anatomic deficiencies.

3. The study confirms the belief of other investigators that Rh negative blood is not related to the occurrence of cleft palate.

4. The study supports the belief of other

investigators that poor nutrition in the mother is either a precipitating factor or an independent cause of cleft lip and cleft palate.

5. The study gives support to the hypothesis of a relationship among defective nutrition, prematurity, spontaneous abortion, stillbirth and cleft palate.

6. There may be a relationship between twinning and cleft palate.

7. Since prematurity and multiple births are related and since they both may be related to cleft palate, then all three factors—prematurity, multiple births and cleft palate—may be interrelated.

8. Since there is a high incidence of spontaneous abortions and stillbirths in the families of children with cleft palate, spontaneous abortion and stillbirth may be related to cleft palate. The occurrence of spontaneous abortion or stillbirth just before the birth of the propositi tends to heighten the chance of the occurrence of cleft palate or other structural abnormalities.

■ SURGERY OF THE TEMPOROMANDIBULAR JOINT. Stuart D. Gordon, M.D. Am. J. Surg. 95:263 Feb. 1958.

The temporomandibular joint suffers from a variety of lesions that require surgical intervention for their relief.

Subluxation is defined as that condition of joint derangement short of dislocation and unassociated with organic disease. Etiological factors remain a matter of conjecture. Clinically, a clicking or snapping of an affected joint is the first complaint followed by a complaint of pain. After these symptoms there may be complaint of locking, restricted mandibular movement and true dislocation. Less severe complaints are relieved by adjustment of dental occlusion. Complaints of considerable severity, including restricted or abnormal movement or locking, are indications for surgical intervention. Roentgenographic examination includes stereoscopic films of both joints in open and closed mouth positions; arthrograms as described by Norgaard have been discontinued because of difficulty of injection, patient discomfort and difficulty of interpretation. Range of motion and position of the condyle in the joint on each side are compared (clinically or roentgenographically). Meniscectomy is the most widely advocated surgical treatment for subluxation. Since vertical height of the treated side is altered, the author has considered replacement of the meniscus a rational procedure and has used a polyethylene cap over the condyle for the past three years. All joints so treated have functioned normally without faulty occlusion.

Dislocation of the temporomandibular joint occurs whenever the condyle passes outside the glenoid fossa, even if the capsule remains intact. Anterior dislocation is the commonest form and may be a single incident or may become recurrent. Reduction is indicated and usually may be done without anesthesia. Splinting for three weeks to allow active opening of only 1 cm. is advocated. Recurrent dislocation does not respond favorably to splinting and is treated by open operation. Procedures used are (1) turning down a strip of temporal fascia as a new external ligament, (2) plication of the capsule, (3) insertion of a wedge of bone to deepen the joint, and (4) the formation of a new external ligament using a strip of fascia lata passed through drill holes in the zygomatic arch and condyle. No dislocation has occurred in 18 patients after this latter type of repair. One patient with irreduceable dislocation was encountered and treated by bilateral condylectomy.

Dislocations in other than anterior direction are accompanied by fracture of the condyle or an associated structure; thus, fracture of the floor of the middle cranial fossa or the anterior wall of the external auditory canal is possible.

Arthritis of the temporomandibular joint occurs as an acute or chronic process. Acute suppurative arthritis may occur as a complication of scarlet fever or any disease which produces bacteremia. If the diagnosis is made within 24 hours, the joint usually may be saved by being opened, evacuating the pus and instituting drainage. Chronic arthritis may occur as an isolated example of osteoarthritis or a complication of Marie-Strümpell spondylitis. Satisfactory clinical results were achieved in

seven of eight patients treated by removal of the affected condyle or a section thereof in three patients with osteoarthritis, and five patients suffering from Marie-Strümpell spondylitis.

Ankylosis of the temporomandibular joint may occur as a result of injury. Treatment is the same as for fusion from any other cause; namely, resection of a portion of the neck of the condyloid process and interposing of some substance to prevent union.—*William J. Amaral.*

■ THE EARLY RADIOLOGICAL DIAGNOSIS OF OSTEOMALACIA IN ADULTS. Marjorie Le May, M.D., Radiology 70:373 March 1958.

Osteomalacia is a disturbance of bone metabolism characterized by an inability of the body to lay down mineral salts on the bone matrix. Its diagnosis is often possible roentgenographically before it is suspected clinically and thus the way is opened to palliative therapy.

Simple lack of calcium in the diet or interference with absorption of calcium from the intestinal tract which prevents a normal calcium supply from reaching the bone may result in osteomalacia. Vitamin D deficiency or an unusual requirement on the part of an individual will result in osteomalacia. Individuals continually using oily cathartics, or who have diseases associated with fatty diarrhea, such as sprue, chronic pancreatitis, and celiac disease, tend to become deficient in fat soluble vitamin D, and they absorb calcium poorly.

Any process causing an abnormal mobilization of calcium or phosphorus from the body may result in osteomalacia. Conditions classified in this category are reported under a variety of names. In the majority of instances the osteomalacia is secondary to or associated with some renal tubular defects. Phosphaturia, renal acidosis glucosuria, and aminoaciduria are the most common findings. Therapy is directed toward minimizing urinary loss of calcium and phosphorus by means of massive doses of vitamin D and correction of electrolyte balance.

In osteomalacia there is defective mineralization of a normal bone matrix, a result of the chemical abnormalities of the blood. The usual blood findings in osteomalacia are a uniformly low phosphorus concentration, a normal or low calcium concentration, and a slightly increased alkaline phosphatase activity. The defective mineralization reveals itself roentgenographically in the typical osteoid deformities of rickets, the uncalcified callus and delayed bony healing of a fracture, and radiolucent zones at the sites of chronic localized trauma, usually where blood vessels lie close to the bones. These last lesions occur in adults, usually associated with generalized fatigue and pain localized to the region of the defects if they involve weight-bearing areas. In an osteomalacic adult the first roentgenographic sign is a radiolucent line in one or more bones subjected to chronic, mild trauma. In normal individuals, where blood vessels cross bones, grooving and irregularities occur as on the inner table of the skull along the meningeal vessels, on the first rib crossed by the subclavian artery and on the scapula by the circumflex scapular artery. Roentgenographically, the grooving is not seen unless the bone is thin or the grooves are caught in profile. In osteomalacia, however, resorbed bone at such sites is replaced by uncalcified matrix with resulting demonstrable defects. The usual sites are the neck of the femur, pubic bone, and lateral border of the scapula. Detection of early lesions has become simplified by correlation of these lesions with location of the vessels on bone. In advanced cases true fractures often occur through the radiolucent zones, and the vertebral bodies may show biconcave deformities and compression fractures. Radiolucent lines rather similar to the pseudofractures of osteomalacia may occur in certain other bone diseases, such as Paget's disease, but in these conditions the bones are visibly abnormal in other ways.

Osteomalacia is most commonly confused with osteoporosis, its diametric opposite. The basic defect in osteoporosis is a lack of bone matrix but no impairment in the mineralization of such osteoid tissue as is present. Pseudofractures do not occur. Roentgenograms show the bones, particularly the spine, to be poorly mineralized, with trabecular pattern of the vertebral bodies poorly seen. Fractures occurring

in osteoporotic patients heal more slowly than in normal individuals, but the callus formed is normally calcified. Osteoporosis may result from any decrease in protein deposition in the body and is commonly seen in old age and in endocrine disturbances such as Cushing's syndrome, acromegaly, and menopause. It may be present if there is considerable malnutrition, and it occurs in disuse atrophy in which the usual stimulae for osteoblastic activity are lost. In uncomplicated osteoporosis, the serum calcium and phosphorus and alkaline phosphatase are normal. Osteoporosis and osteomalacia may occur together.

Hyperparathyroidism does not produce the picture of osteomalacia in adults. The majority of hyperparathyroid patients show no bone changes, but if the alkaline phosphatase is elevated, bone changes may be expected. The characteristic features are resorption of cortical bone, which may be seen best in the hands, usually with fragmentation of the terminal phalanges, a disappearance of the lamina dura, and a hazy appearance of all or part of the vault.—*William J. Amaral.*

■ Oral Herpetiform Lesions Treated with Gamma Globulin. L. P. Strean, B. H. Williams and John Prichard. Oral Surg., Oral Med. & Oral Path. 11:266 March 1958.

Ulcerative lesions of the oral mucous membrane have been designated variously as herpetic gingivostomatitis, recurrent aphthous stomatitis, Behcet's syndrome, canker sores, recurrent aphthae, herpes labialis, herpes simplex, cold sores and fever sores. Practically all authors agree that herpetic gingivostomatitis is caused by the herpes simplex virus, whereas recurrent aphthous stomatitis is believed to be noninfectious and of unknown origin.

This article suggests a new terminology for the vesicular form of oral lesions and a new treatment for this recalcitrant disease of the oral cavity.

Herpetic gingivostomatitis is characterized by an eruption of multiple transparent vesicles which usually are confined within the epidermis. As the blisters break and the expressed fluid dries, an adherent yellow crust forms. The eruptions may be accompanied by fever, malaise, fetor oris and increased salivation.

Recurrent aphthous stomatitis is characterized by discrete or multiple vesicles which, on breaking, have a grayish surface surrounded by an erythematous zone. Fever, fetor oris and increased salivation are not present.

Since herpes simplex virus has been cultivated from the lesions and from the saliva of patients suffering from herpetic gingivostomatitis, and since this virus has not been cultivated from oral aphthae, some authors believe that the latter are noninfectious. The possibility exists, however, that oral aphthae may be caused by an unknown virus simulating herpes simplex. The antibody titer for herpes simplex virus in the presence of either herpetic gingivostomatitis or oral aphthae usually is high. Because of the doubtful origin of these lesions, it is suggested that they be called "herpetiform lesions."

Human poliomyelitis immune globulin, also known as gamma globulin, contains significant concentrations of the antibodies useful in attenuation or prevention of poliomyelitis, measles and infectious hepatitis. Since this blood fraction taken from a large pool of blood presumably contains antibodies against other infectious agents, an attempt was made to test its effect in the treatment of herpes zoster and chickenpox. The results of treatment in 11 patients appeared encouraging. Because of this, an attempt was made to expand its usage to include the treatment of herpetiform lesions of the oral cavity.

The five case reports cited are representative of a series of 25 cases in which gamma globulin was used for the prevention or treatment of herpetiform lesions of the oral cavity. The patients' ages ranged from 15 to 50 years, and there were 18 women and seven men. All patients received gamma globulin; the smallest dose was 3 cc. and the largest was 20 cc. In some patients only one 3 cc. injection brought relief; in other patients daily injections of from 10 cc. to 20 cc. for six weeks were necessary to produce full recovery.

The results of treating herpetiform lesions of the oral cavity with gamma globulin are

sufficiently encouraging to warrant further clinical trial. Traumatic, physiologic or severe emotional stress may play a significant role in the etiology of vesicular stomatitis.

■ REACTIVE TOOTH POSITIONING. Ira Franklin Ross. Oral Surg., Oral Med. & Oral Path. 10:725 July 1957.

Certain deviations in tooth position may be inherent. These can be accepted within normal limits when considering the individual. However, malposed teeth may align themselves if certain insulting influences are removed, hence the term "reactive positioning" has been justly applied.

That teeth may be moved by bite planes, steel ligatures and rubber dam elastics is a clinical fact. Reactive or endogenous tooth movement must be considered of equal importance. Careful removal of certain etiological agents such as abnormal inclined plane relations and inevitable soft tissue collapse may lead to better alignment of teeth.

A critical appraisal must reveal adequate space to reposition the malposed tooth. Elongated cusps as well as blocked cusps must be dealt with. The reshaped tooth must not be devoid of all of its outer structure. Varying degrees of reactive positioning will follow; the all-or-none law need not apply.

Clinical illustrations have been shown to justify the approach. Careful case analysis and treatment planning will enhance the integrity of the stomatognathic system.—*George S. Kendrick.*

■ ORAL AMYLOID AS A COMPLICATION OF MYELOMATOSIS. Lester Cahn. Oral Surg., Oral Med. & Oral Path. 10:735 July 1957.

There are two major types of amyloid—a primary variety and a secondary type. The two are different both in staining properties and in distribution. Secondary amyloid is found in the spleen, liver, blood vessels and adrenals whereas the primary type infiltrates the mesodermal tissues of the blood vessels, heart, skeletal muscles, synovia, mouth and the tongue. Amyloid deposition is a complication of myelomatosis according to Apitz's theory and in five patients, deposits of amyloid in the tongue and buccal mucosa were the first clinical signs of myelomatosis. These patients complained of sore mouths, but evidence of frank bone lesions, hyperglobulinemia and elevated total serum protein was absent at this time. With the progression of myelomatosis, sternal puncture showed myeloma cells and electrophoresis revealed increased levels of alpha and beta globulins. Here is another oral sign of a systemic disease for which the dentist may well be the first one consulted.—*Eugene R. Zimmermann.*

■ ATYPICAL SUPERNUMERARY TEETH (ZWEI ATYPISCHE FÄLLE VON UBERZÄHLIGEN ZÄHNEN). H. Grasser. Zahnarztl. Welt & Reform 11/57:239 Aug. 10, 1956.

Supernumerary teeth are a common occurrence and usually they are abnormal in size and shape. Inquiries into the probable causes of this apparent abnormality led to the hypothesis that human dentition at a certain evolutionary period must have been composed of at least 44 teeth. In the course of evolution, man has lost 12 teeth. In nearly every instance observed, the supernumerary teeth seemed to be lost teeth which reappeared and tried to erupt into the positions they once held in the human arch.

Supernumerary teeth may be divided into two major categories—those that are similar and those that are dissimilar to normal tooth forms.

Frequently, several members of one family have supernumerary teeth located at almost the same position. The abnormality often can be traced through several generations.

Occasionally, reports have appeared in dental literature describing the occurrence of a third set of teeth (third dentition). This phenomenon, however, usually can be traced to the presence of several unerupted or supernumerary teeth that were not extracted at the time other permanent teeth were removed. The

appearance of numerous supernumerary teeth gives the impression that a third set of teeth has erupted.

Supernumerary incisors are frequently observed, but supernumerary cuspids are rare. Supernumerary bicuspids appear quite often, but supernumerary molars are found only occasionally at the very end of the dental arch, and they are often misnamed "fourth molars."

In the anterior region, it is often difficult to distinguish between supernumerary deciduous and permanent teeth, especially if the teeth are impacted and can be observed only in roentgenograms.

Erupted supernumerary teeth cause crowding and malocclusion, and immediate elimination is indicated. In most instances, orthodontic treatment is required after extraction to correct the rotated and abnormally positioned teeth remaining in the dental arch.

Embedded supernumerary teeth seldom cause disturbances or pathologic symptoms, and their presence is often discovered accidentally in routine examinations. Surgical removal of embedded supernumerary teeth is indicated only if they interfere with the normal alignment of adjacent erupted teeth. This may occur if the supernumerary teeth are impacted between roots of upper central incisors and cause diastema. Attempts to reduce these abnormal spaces by orthodontic treatment will fail unless the supernumerary teeth are surgically removed. Removal of impacted supernumerary teeth is indicated if they prevent the normal eruption of permanent teeth.

■ CONTAMINATION OF ANESTHETIC NEEDLES. Donald T. Bennett. J.D. Res. 37:144 Feb. 1958.

A series of 100 sterilized local anesthetic needles were examined for possible bacteriologic contamination which might occur when such needles were exposed to the atmosphere, in circumstances reasonably similar to those which could arise in general practice.

The series was divided into two experimental groups. Group A consisted of 50 needles which were exposed freely to the atmosphere for 15 minutes. After this interval, five needles (10 per cent) were found to be contaminated by saprophytic organisms. In group B, a similar number of needles were covered with a "clean" absorbent cotton roll. In this group only two needles (4 per cent) were contaminated with similar organisms. No pathogenic organisms were detected in either group.

Announcements

■ Don Lyons Installed as President of Academy

Don C. Lyons was installed as president of the American Academy of Dental Medicine at the group's 12th annual meeting in Montreal, Canada, in late May.

Other officers elected were George G. Stewart, president-elect; Hermann Becks, vice-president; Harold Lavine, secretary; William M. Greenhut, treasurer, and Irving Yudkoff, editor of the *Journal of Dental Medicine.*

At an awards dinner on May 29, honorary memberships were conferred on Dr. Adelard Groulx, director of the City of Montreal Health Department, and Don Gullett, secretary of the Canadian Dental Association.

Marcel B. Archambault of Montreal was the outgoing president.

■ Dental Congress in Cuba Postponed Until 1959

The Fifth National Dental Congress of the Colegio Estomatológico Nacional de Cuba, which was scheduled for November 14-17, has been postponed until 1959.

Dates for the congress will be set later, according to Claudio Funcia Cornell, president of the Comision Cientifica of the Colegio.

■ American Academy of Oral Pathology Names Officers

Officers of the American Academy of Oral Pathology were elected at the annual meeting in Washington, D. C. They are:

President, Charles Waldron; president-elect, Joseph Bernier; vice-president, Robert Colby, and secretary-treasurer, Robert J. Gorlin.

Applications for membership and fellowship are made through the office of the secretary-treasurer. Address all inquiries to Robert J. Gorlin, secretary-treasurer, American Academy of Oral Pathology, School of Dentistry, University of Minnesota, Minneapolis 14.

■ Memorial Foundation's Annual Seminar to be Held in Texas

The Rowe Smith Memorial Foundation announces its 1958-59 annual seminar, to be held January 18-21 at Fly-N-Fish Lodge on Caddo Lake, Karnack, Texas.

The subject will be "The Blood and Bleeding," and will feature as clinicians: E. Cheraskin, chairman of the department of oral medicine, University of Alabama School of Dentistry; Joseph M. Hill, M.D., director, Wadley Research Institute and Blood Bank, Dallas, Texas; Raymond W. Monto, M.D., physician-in-charge, division of hematology, Henry Ford Hospital, Detroit, and Robert B. Shira, chief of oral surgery, Walter Reed Army Hospital, Washington, D. C. Lon Morrey, editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, will be guest of honor.

Further information may be obtained from the Rowe Smith Memorial Foundation, 501 State National Bank Bldg., Texarkana, Ark.

■ Two-week Maxillofacial Surgery Course Offered at Illinois

A concentrated two-week course in oral and maxillofacial surgery beginning October 13 will be given by the division of postgraduate education at the College of Dentistry of the University of Illinois.

Subjects include treatment of cysts, apicoectomy, mouth preparation for dentures, removal of impactions, management of fractures and care of the hospitalized patient. Daniel M. Laskin, associate professor of oral surgery, will direct the course, which will be taught by faculty members of the Colleges of Dentistry and Medicine.

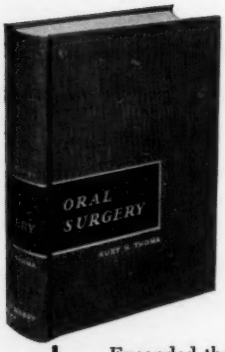
Information and applications can be obtained from the Division of Postgraduate Education, University of Illinois College of Dentistry, 808 S. Wood St., Chicago 12.

■ Hospital Dental Services Are Considered at Institute

The status of the dentist on the hospital staff and the expansion of the dental program in the hospital to include restorative, prosthetic and preventive procedures were among the topics discussed at the Second Institute on Hospital Dentistry, which was held June 2-5 at the Edgewater Beach hotel in Chicago. The Third Institute has been scheduled tentatively for May 18-21, 1959, in San Francisco.

Fifty-five dentists, including 36 chiefs of dental services and seven chiefs of oral surgery departments, were among those attending. The Institute was sponsored jointly by the American Dental Association, the American Hospital Association and the American Medical Association.

Dental services have been established in 2,241 of the 6,966 hospitals in the United States. Of these, 462 dental programs have been approved as meeting the standards established by the Council on Hospital Dental Service of the American Dental Association, according to Gerard J. Casey, secretary of the Council.



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